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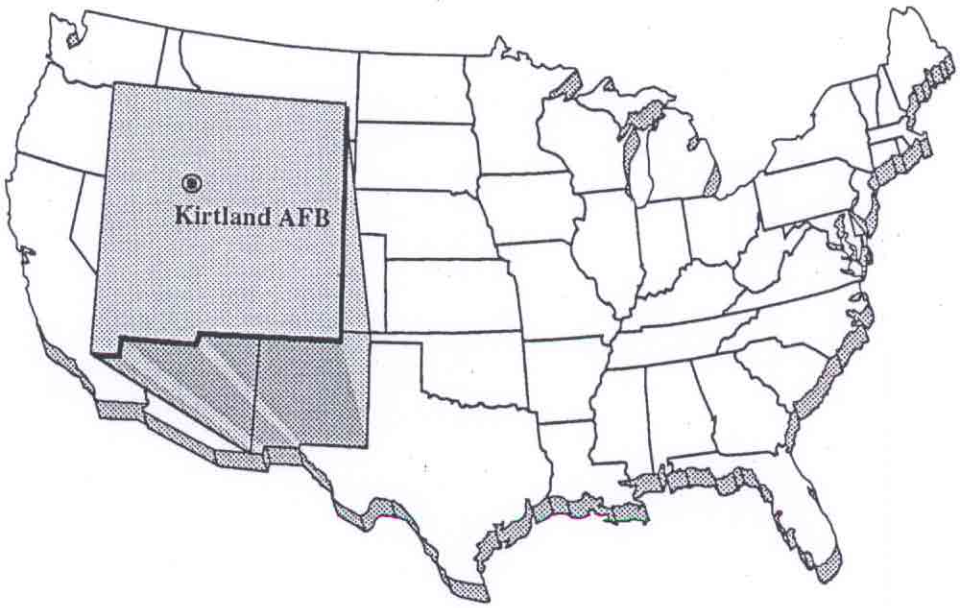
ENVIRONMENTAL ASSESSMENT
July 1994



TRANSPORTATION AND STORAGE OF ROCKET SYSTEMS LAUNCH PROGRAM SOLID ROCKET MOTORS KIRTLAND AIR FORCE BASE, NEW MEXICO

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FINDING OF NO SIGNIFICANT IMPACT

TRANSPORTATION OF MINUTEMAN II SOLID ROCKET MOTORS TO NAVAJO DEPOT ACTIVITY, ARIZONA AND KIRTLAND AFB, NEW MEXICO

Description of Proposed Action

The Proposed Action is to transport Minuteman (MM) II motors to the Navajo Depot Activity (NADA), Arizona and Kirtland Air Force Base (AFB), New Mexico, via the public highway system from the following locations: Hill AFB, Utah; Utah Test and Training Range (UTTR); and Pueblo Depot Activity (PUDA), Colorado. The Proposed Action sets forth state-approved transportation routes to be used during MM II motor shipments. The purpose and need of the Proposed Action is to facilitate the deactivation of the MM II missile system by providing safe carriage of rocket motors to NADA and Kirtland AFB. There are no construction impacts associated with the Proposed Action.

Alternatives

a. Alternatives Eliminated: Both air and rail were eliminated as reasonable modes of transportation. The equipment needed to transport the motors by air or rail has not yet been designed.

b. No-Action Alternative: The No-Action Alternative was considered and is addressed in the attached environmental assessment (EA). Adoption of this alternative would mean that MM II motors temporarily stored at Hill AFB, UTTR, and PUDA would remain in place. Implementation of this alternative would eliminate all of the potential environmental impacts associated with transporting the MM II motors to Kirtland AFB and NADA. However, choosing this alternative would be inconsistent with the Air Force deactivation plan which has designated both NADA and Kirtland AFB as storage sites for decommissioned MM II missile motors. Further, PUDA is scheduled to be closed, and motor storage at Hill AFB and UTTR is occupying space needed for other planned missile maintenance activities. Therefore, the No-Action Alternative was rejected because it does not meet the Air Force mission requirement of providing long-term storage of MM II motors at approved storage facilities.

Environmental Consequences

The attached EA considered all environmental resources which could be potentially affected by the Proposed Action; consequently, the following resources were considered: air quality, water resources, soils, biological resources, noise, and safety considerations. The attached EA concluded that the Proposed Action would not produce any significant impacts on the above-mentioned resources. The only impact on air quality would be the negligible amount of carbon monoxide emitted from the transport vehicles, approximately 2 shipments per month. Other than occasional "road kills", biological resources would not be affected. Accident probabilities and consequences are discussed in the chapter entitled "Safety Considerations". The EA concludes that the probability of a propellant fire during transportation of motors is extremely low.

Evaluation

There will be no irreversible or irretrievable commitment of resources at Hill AFB, UTTR, PUDA, NADA, Kirtland AFB, or the transportation corridors as a result of implementing the Proposed Action. The Proposed Action would not eliminate any options for future use of the environment at or around the installations or along the transportation corridors. There are no known adverse environmental effects that cannot be avoided for the Proposed Action.

Conclusions

It has been determined, after consideration of all factors included in the EA and pertinent environmental legislation, that the action will not significantly affect the quality of the human environment, and there would be no significant environmental effects associated with this actior For the foregoing reasons, a Finding of No Significant Impact is appropriate, and an Environment Impact Statement will not be prepared.

Approved: Lester L. Lyles
LESTER L. LYLES, Brig. Gen., USAF
Chairperson, Environmental Protection Committee
Hill Air Force Base, Utah

Date: 22 Dec. 1997

ENVIRONMENTAL ASSESSMENT

TRANSPORTATION AND STORAGE OF ROCKET SYSTEMS LAUNCH PROGRAM SOLID ROCKET MOTORS, KIRTLAND AIR FORCE BASE, NEW MEXICO

JULY 1994

ACRONYMS AND ABBREVIATIONS

A-3	Polaris missile system
ACM	asbestos-containing material
AFB	Air Force Base
AFR	Air Force Regulation
AR	Army Regulation
BRAC	Base Realignment and Closure Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CTW	Crew Training Wing
DOD	Department of Defense
DOE	Department of Energy
DRMO	Defense Reutilization and Marketing Office
°F	degree Fahrenheit
EA	environmental assessment
EPA	Environmental Protection Agency
HCl	hydrogen chloride
IRP	Installation Restoration Program
kVA	kilovolt-amperes
MGD	million gallons per day
MMII	Minuteman II
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
OPLAN	operating plan
PCB	polychlorinated biphenyl
P.L.	Public Law
ppm	parts per million
PUDA	Pueblo Depot Activity
RCRA	Resource Conservation and Recovery Act
ROI	Region of Influence
RSLP	Rocket Systems Launch Program
SHPO	State Historic Preservation Officer
S.R.	State Route
SUBASE	Submarine Base
U.S.	United States Highway
U.S.C.	United States Code

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1.0 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

This environmental assessment (EA) examines the potential for impacts to the environment that could result from the transportation of U.S. Air Force Rocket Systems Launch Program (RSLP) Polaris (A-3) Stage I rocket motors from Naval Submarine Base (SUBASE) Bangor, Washington, to Kirtland Air Force Base (AFB), New Mexico, and Camp Navajo (formerly Navajo Depot Activity), Arizona; storage of A-3 and Minuteman II (MMII) Stages II and III rocket motors at Kirtland AFB; and storage of A-3 Stage I rocket motors at Camp Navajo (Figure 1.0-1). This document has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508), and Air Force Regulation (AFR) 19-2 (Environmental Planning-Environmental Impact Analysis Process). AFR 19-2 addresses implementation of NEPA and directs Air Force officials to consider environmental consequences as part of the planning and decision-making process.

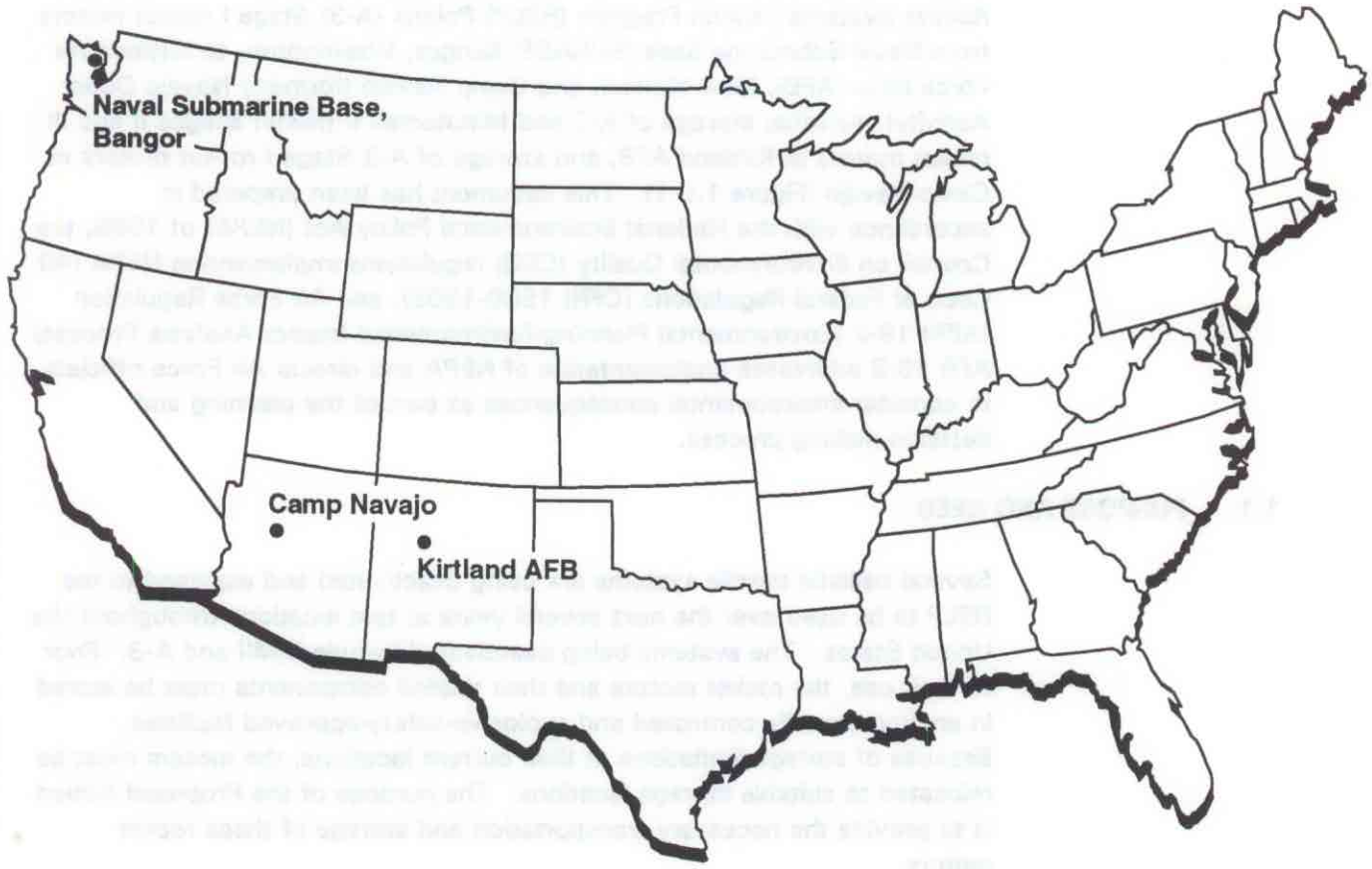
1.1 PURPOSE AND NEED

Several ballistic missile systems are being deactivated and assigned to the RSLP to be used over the next several years at test locations throughout the United States. The systems being deactivated include MMII and A-3. Prior to their use, the rocket motors and their related components must be stored in environmentally controlled and explosive-safety-approved facilities. Because of storage limitations at their current locations, the motors must be relocated to suitable storage locations. The purpose of the Proposed Action is to provide the necessary transportation and storage of these rocket motors.

1.2 DECISIONS TO BE MADE

The following decisions will be made based on the information contained within this EA:

- A site will be selected for storage of the RSLP rocket motors and components.
- Specific facilities will be selected for storing the rocket motors, and modifications to support facilities will be identified.
- A determination will be made whether to transport the A-3 Stage I rocket motors to Kirtland AFB or Camp Navajo.



Locations of Kirtland Air Force Base, Camp Navajo, and Naval Submarine Base, Bangor

Figure 1.0-1

1.3 SCOPE OF THE ENVIRONMENTAL REVIEW

The RSLP storage effort would include transport of MMII and A-3 rocket motors to Kirtland AFB and/or Camp Navajo, and storage in the Manzano Weapons Storage Area (Manzano Area) at Kirtland AFB and/or in igloo storage areas at Camp Navajo.

Parts of this overall effort have been previously documented in two EAs: one for storage of MMII motors at Camp Navajo and the other for transportation of MMII motors to Camp Navajo and Kirtland AFB.

The Proposed Action in Environmental Assessment, Storage of Rocket Motors at Navajo Depot Activity, Bellemont, Arizona (U.S. Air Force, 1992a) includes the modification of 123 storage igloos; storage of 1,500 MMII Stage I, II, and III rocket motors and inert hardware in existing igloos and buildings; construction or modification of an existing building for use as a motor transfer facility; and installation of a new overhead electrical distribution system. The Proposed Action requires a temporary construction crew of 30 persons and an operational work force of 50 persons, and includes earth disturbance associated with igloo modifications, installation of the electrical distribution system, and construction of a new motor transfer facility. This EA resulted in a Finding of No Significant Impact, a copy of which is provided in Appendix A.

At the time the MMII Storage EA was prepared, Kirtland AFB was not available for consideration as a potential RSLP storage site. Since that time, the Kirtland AFB Manzano Area became available and was found to be a feasible storage location (see Section 2.3 for further discussion). Therefore, it was proposed that MMII Stage II and III rocket motors also be stored at Kirtland AFB in addition to storage at Camp Navajo. Because the storage of MMII rocket motors at Kirtland AFB has not been addressed in previous environmental documentation, it is defined as part of the Proposed Action for this EA in Section 2.1.

The Proposed Action in Environmental Assessment, Transportation of Minuteman II Solid Rocket Motors to Navajo Depot Activity, Arizona, and Kirtland Air Force Base, New Mexico (U.S. Air Force, 1992b) is the transportation of 1,300 MMII Stage I, II, and III rocket motors from current, temporary storage locations at Hill AFB and the Utah Test and Training Range, Utah, and Pueblo Depot Activity, Colorado, to Kirtland AFB and Camp Navajo. Rocket motors would be transported by tandem or triple-axle tractor-trailers using commercial truck routes, state approved for transport of hazardous materials and explosives. A primary and secondary transport route between each of the current, temporary storage locations and Kirtland AFB and Camp Navajo were analyzed. This EA resulted in a Finding of No Significant Impact, a copy of which is provided in Appendix A.

Transportation and storage of A-3 motors was not previously part of the RSLP storage effort, and was not analyzed for either location. Therefore, this EA analyzes the transportation of A-3 rocket motors from SUBASE Bangor to Kirtland AFB and storage at the Manzano Area, as part of the Proposed Action. Transportation of A-3 rocket motors from SUBASE Bangor to and storage at Camp Navajo is analyzed as the Camp Navajo Alternative. In addition, the potential environmental impacts of the No-Action Alternative are also evaluated.

Table 1.3-1 shows the various RSLP storage activities, the locations where they would occur, and the applicable environmental documentation for each activity and location.

The objective of this EA is to provide sufficient analysis and evidence for determining the need for an Environmental Impact Statement or a Finding of No Significant Impact (40 CFR 1508.9), in accordance with CEQ regulations for implementing NEPA and AFR 19-2. The scope of analysis presented in this EA is defined by the range of potential environmental impacts that would result from implementation of the Proposed Action and alternatives. Resources that have a potential for impacts were considered in the analysis. Descriptions of the affected environment and the potential environmental consequences relative to these resources are addressed in Chapters 3 and 4, respectively.

For some resources, initial analysis indicated that the proposed activities would not result in either short- or long-term impacts. The resources that were analyzed in more detail, and those not addressed, are listed below by location.

1.3.1 Resources along the Transportation Routes

The A-3 motors would be transported on a tandem or triple-axle tractor-trailer, i.e., the same type of tractor-trailer that would be used for MMII motors as discussed in the MMII Transportation EA (U.S. Air Force, 1992b). Portions of the same routes described in that EA would be used. Although the A-3 motors would also be transported through areas not discussed in the MMII Transportation EA, the conclusions of that analysis would apply to the resources along both the MMII and A-3 transportation routes. Because that EA resulted in a Finding of No Significant Impact (see Appendix A), resources along the A-3 transportation routes will not be addressed in detail, except for hazardous materials/waste management. The resources along the transportation routes not addressed in detail in this EA are air quality, biological resources, cultural resources, land use, noise, physical resources, socioeconomics, transportation, utilities, and water resources. The reasons for not further addressing these resources, drawn from the conclusions of the MMII Transportation EA, are presented below and apply only to routine transport of MMII and A-3 motors. Potential impacts to resources due to

Table 1.3-1. RSLP Storage Effort Activities and Environmental Documentation

Activities	Locations										
	Storage					Transportation Routes					
	Hill AFB	Kirtland AFB	Camp Navajo	PUDA	SUBASE, Bangor	Hill AFB to Kirtland AFB	Hill AFB to Camp Navajo	PUDA to Camp Navajo	PUDA to Kirtland AFB	SUBASE to Kirtland AFB	SUBASE to Camp Navajo
Loading MMII Motors	O[a]	--	--	O[a]	--	--	--	--	--	--	--
Loading A-3 Motors	--	--	--	--	X	--	--	--	--	--	--
Transporting MMII Motors	--	--	--	--	--	O[a]	O[a]	O[a]	O[a]	--	--
Transporting A-3 Motors	--	--	--	--	--	--	--	--	--	X	X
Transferring/ Storing MMII Motors	--	X	O[b]	--	--	--	--	--	--	--	--
Transferring/ Storing A-3 Motors	--	X	X	--	--	--	--	--	--	--	--

Notes: (a) Source: U.S. Air Force, 1992b.
(b) Source: U.S. Air Force, 1992a.
-- = Not applicable.
O = Analyzed in previous environmental documentation.
X = Analyzed in this environmental assessment.
A-3 = Polaris missile system.
PUDA = Pueblo Depot Activity.
SUBASE = Submarine Base.

accidents along the A-3 transportation routes are briefly discussed in Chapter 5.

Air Quality. A maximum average of seven trucks per week would be added to the existing traffic on the transportation routes. Because this small number of trucks would be distributed over several states, the amount of pollutants emitted into the air in any one air basin would not be significant, even for areas that are not in attainment of criteria pollutants (e.g., Las Vegas, Nevada, and Salt Lake City, Utah, for carbon monoxide); therefore, impacts to air quality along transportation routes would not be expected.

Biological Resources. Transporting rocket motors does not entail types of activities that present a potential for impacts to biological resources (e.g., alteration or loss of habitats, disturbance to wildlife). Transportation activities would occur on existing truck routes. Impacts to plant or animal species along the transportation routes would not be expected.

Cultural Resources. Transporting rocket motors does not entail types of activities that present the potential for adverse effects to cultural resources (e.g., ground disturbance, modification and/or demolition of historic structures). Transportation activities would occur on existing roads and highways. Impacts to cultural resources along transportation routes would not be expected.

Land Use. Transportation of rocket motors in tractor-trailers on approved truck routes would not change or conflict with any established land uses. Impacts to land use along transportation routes would not be expected.

Noise. Because the tractor-trailers would travel on existing truck routes, the additional traffic noise from the tractor-trailers would not significantly affect ambient noise levels along the truck routes. State and local noise ordinances do not apply to vehicles traveling on commercial truck routes. Noise impacts along transportation routes would not be expected.

Physical Resources. Transportation activities would be on paved roads and highways. This would not present the potential for erosional impacts and would not preclude use of mineral resources or prime farmland that was not already lost due to the presence of the roadway. Impacts to physical resources along the transportation routes would not be expected.

Socioeconomics. The small increase in the number of truck drivers using existing truck routes would not result in changes in employment and population along the transportation routes. No socioeconomic impacts along transportation routes would be expected.

Transportation. Rocket motors would be transported using existing truck routes. No upgrades or changes to existing infrastructure would be

required. The small number of tractor-trailers added to existing levels of truck traffic would not represent an impact to the transportation infrastructure.

Utilities. Transportation activities would generate negligible increases in demands on electrical, natural gas, water supply, wastewater, and solid waste systems. Impacts to utilities along the transportation routes would not be expected.

Water Resources. Bodies of surface water and groundwater adjacent to the transportation routes would not be affected because the A-3 rocket motors are insulated from the environment by the tractor-trailer. These routes are routinely traveled by commercial tractor-trailers with negligible impacts to water resources. Impacts to water resources along transportation routes would not be expected.

1.3.2 Resources at Kirtland AFB and Camp Navajo

Air quality, biological resources, cultural resources, hazardous materials and waste management, utilities, and water resources are addressed in Chapter 4. Resources which are not addressed for Kirtland AFB and Camp Navajo are land use, noise, physical resources, socioeconomics, and transportation. The reasons for not addressing these resources are discussed in the following paragraphs.

1.3.2.1 Kirtland AFB

Land Use. The Manzano Area was formerly a weapons storage area and is currently used for storage including explosive storage. Use of facilities at the Manzano Area for transfer and storage of RSLP rocket motors would not change the existing use and would not present any land use conflicts. Impacts to land use would not be expected.

Noise. The major noise source on Kirtland AFB is associated with aircraft operations. Noise associated with the Proposed Action would be limited to temporary construction noise and intermittent truck noise during rocket motor delivery. Because the Proposed Action would not significantly increase ambient noise levels on the base and would be similar to current activities, noise impacts would not be expected.

Physical Resources. The majority of soil disturbance would be limited to removing the earth covering on existing igloos, earth movement at Plant 4, and possible trenching along existing utility corridors for electrical distribution lines. These activities would be accompanied by standard soil erosion control measures, which would limit the potential for erosion. Impacts to physical resources at Kirtland AFB would not be expected.

Socioeconomics. The small number of temporary construction personnel that would be required for facility modifications would be drawn from local, existing labor pools. The 5 to 12 personnel required for storage operational activities would be a less than 0.1 percent increase in the current base work force and would not represent significant on-base or regional population and work force increases. No socioeconomic impacts would be expected.

Transportation. The Proposed Action would use public and on-base road systems for the movement of rocket motors and associated supplies, equipment, and personnel. For environmental analysis purposes, the impacts to transportation are measured in terms of level of service. The Proposed Action would add a maximum of 15 tractor-trailers per week to on-base traffic. A maximum of 12 additional personnel would add a maximum of 12 vehicles to peak-hour traffic, which would not affect the level of service. Therefore, impacts to transportation on Kirtland AFB from the Proposed Action would not be expected.

1.3.2.2 Camp Navajo

Land Use. An existing motor transfer facility and existing igloos in munitions storage areas would be used. There would be no changes to or conflicts with existing land uses at Camp Navajo. Off-base land uses would not be affected. Therefore, impacts to land use would not be expected.

Noise. The major noise source on Camp Navajo is associated with storage of military items including ordnance and rocket motors. Noise associated with the Camp Navajo Alternative would be limited to temporary construction noise and intermittent truck noise during rocket motor delivery. Because the Camp Navajo Alternative would not significantly increase ambient noise levels on the base and would be similar to current activities, noise impacts would not be expected.

Physical Resources. Soil disturbance would be limited to removing the earth covering of seven igloos, and possible trenching for electrical distribution lines. These activities would be accompanied by standard soil erosion control measures as required, thus limiting soil loss. Impacts to physical resources at Camp Navajo would not be expected.

Socioeconomics. The small number of temporary construction personnel that would be required for facility modifications would be drawn from local, existing labor pools. No additional personnel would be required for operational storage activities at Camp Navajo; therefore, no change in on-base and regional employment and population would occur. Socioeconomic impacts would not be expected.

Transportation. Potential transportation impacts under the Camp Navajo Alternative would be similar to those under the Proposed Action. Under the

Camp Navajo Alternative there would be no increase in traffic related to any increases in personnel. No changes in level of service would occur on roads on the installation. Impacts to transportation on Camp Navajo would not be expected.

1.4 APPLICABLE REGULATORY REQUIREMENTS AND COORDINATION

State transportation departments were contacted to ascertain which roads could be used to transport the RSLP motors from SUBASE Bangor to Kirtland AFB and Camp Navajo. The transportation contractor would be required to obtain a hazardous materials permit for the transportation of the rocket motors, where applicable.

Depending on the extent of facility and utility upgrades required for the Proposed Action at Kirtland AFB, the total area of soil disturbance would vary. If the total area of soil disturbance exceeds 3/4 acre, a topsoil disturbance permit would be required from the City of Albuquerque Environmental Health Department, Air Pollution Control Division in accordance with Albuquerque-Bernalillo County Air Quality Control Board regulations.

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2.0 DESCRIPTIONS OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Proposed Action and alternatives to the Proposed Action, including the No-Action Alternative, which were considered and analyzed. In addition, it includes a brief discussion of the alternatives considered but eliminated from further study, and a comparison of the environmental consequences of the Proposed Action and the alternatives that were analyzed.

2.1 DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action is the transportation of Polaris A-3 Stage I solid propellant rocket motors from SUBASE Bangor to Kirtland AFB, and the long-term storage of MMII Stage II, MMII Stage III, and A-3 Stage I rocket motors at the Manzano Area. As discussed in Section 1.3, transportation of MMII rocket motors from Hill AFB and Pueblo Depot Activity to Kirtland AFB has been documented (U.S. Air Force, 1992b) and is not analyzed as part of the Proposed Action in this EA. However, this activity would be similar to the transport of the A-3 motors as described in this EA. The basic characteristics of the rocket motors proposed for storage are described in Table 2.1-1.

Table 2.1-1. Characteristics of Solid Rocket Motors Proposed for Storage at Manzano Area, Kirtland AFB

Motor Type	Weight (lb) Propellant Only	Weight (lb) Stage	Size	Propellant Classification	Current Location	Quantity (Approximate)
Minuteman II						
Stage II	13,750	15,500	52" x 14'	1.3	Hill AFB/Pueblo Depot Activity	250
Stage III	3,665	4,250	38" x 7'	1.1	Hill AFB/Pueblo Depot Activity	140
Polaris (A-3)						
Stage I	20,800	23,900	54" x 15.2'	1.3	SUBASE Bangor	60

SUBASE = Submarine Base.

2.1.1 Transporting Rocket Motors to Kirtland AFB

The A-3 rocket motors in storage at SUBASE Bangor would be loaded for transport to Kirtland AFB. SUBASE Bangor is a U.S. Navy installation on the Hood Canal in Puget Sound, located in Kitsap County in northwestern Washington. The storage and handling of A-3 rocket motors are routine activities for the U.S. Navy at SUBASE Bangor.

The motors would be loaded into standard-size, climate-controlled tandem or triple-axle tractor-trailers. Each tractor-trailer can transport one A-3 Stage I motor. The trailers would be properly placarded before leaving the base in accordance with U.S. Department of Transportation regulations (49 CFR 172).

The motors would be transported over truck routes that are state-approved for transport of hazardous materials and explosives. Transportation of the rocket motors would be conducted in accordance with U.S. Department of Transportation regulations for interstate shipment of hazardous substances (49 CFR 100-199). Applicable state hazardous material transport permits would also be obtained. The RSLP shipment schedule is shown in Table 2.1-2.

Table 2.1-2. Schedule of Shipment

	Time Frame (months)	Number of Stages per Trailer	Number of Trailers per Week	Total Stages Transported
Polaris (A-3):				
Stage I	2	1	7	60
Minuteman II:				
Stage II	11	2	6	250
Stage III	10	3	2	140

The following sections describe the primary and secondary transportation routes for A-3 motors from SUBASE Bangor to Kirtland AFB. Although the primary route is shorter, either route could be used. Other routes may be more direct, but could not be considered because of commercial vehicle restrictions due to narrow and/or steep roadways, bridge weight restrictions, or restrictions on transport of potentially explosive loads (e.g., on U.S. Highway [U.S.] 93 over Hoover Dam).

2.1.1.1 SUBASE Bangor to Kirtland AFB - Primary Transportation Route. From SUBASE Bangor, the motors would be transported south on Washington State Route (S.R.) 3 to U.S. 101 at Shelton, south on U.S. 101 to Interstate 5 at Olympia, south on Interstate 5 to Interstate 205 near Vancouver, Washington, south on Interstate 205 into Oregon and on to Interstate 84, east on Interstate 84 through Oregon and Idaho and into Utah to Interstate 15, south on Interstate 15 to Interstate 215, south on Interstate 215, bypassing Salt Lake City and back to Interstate 15 again, south on Interstate 15 to U.S. 6 at Spanish Fork, south on U.S. 6 to Interstate 70, east on Interstate 70 through Green River to U.S. 191, south

on U.S. 191 into Arizona and on to Interstate 40, east on Interstate 40 into New Mexico and on to Kirtland AFB (Figure 2.1-1). This route is approximately 1,750 miles.

2.1.1.2 SUBASE Bangor to Kirtland AFB - Secondary Transportation Route. From SUBASE Bangor, the motors would be transported along the same route as that described for the primary route until Twin Falls, Idaho, where the tractor-trailer would exit Interstate 84 and head south on U.S. 93 into Nevada. At Ely, Nevada, the route would continue south on U.S. 6 to Nevada S.R. 318, south on S.R. 318 to U.S. 93, south on U.S. 93 to Interstate 15, south on Interstate 15 through Las Vegas to Nevada S.R. 146, east on S.R. 146 to U.S. 95, south on U.S. 95 to Nevada S.R. 163, east on S.R. 163 across Davis Dam and continuing east on Arizona S.R. 68 to U.S. 93, south on U.S. 93 to Interstate 40 at Kingman, east on Interstate 40 into New Mexico, and through Albuquerque into Kirtland AFB (see Figure 2.1-1). This route is approximately 1,840 miles.

2.1.2 Transferring Rocket Motors at Kirtland AFB

The MMII Stage II and III, and the A-3 Stage I solid propellant rocket motors would be transported to Kirtland AFB (Figures 2.1-2 and 2.1-3) for storage in the Manzano Area (Figure 2.1-4). The motors would likely be transported from Interstate 40 to the base via Eubank Boulevard. Once on base, the tractor-trailers would continue to Pennsylvania Avenue for access to a transfer location, either at an overhead crane on Pennsylvania Avenue or in the Manzano Area.

Prior to RSLP motor storage at the Manzano Area, an Explosive Site Safety Plan would be prepared and submitted for approval to the Department of Defense (DOD) Explosive Safety Board in accordance with AFR 127-100, Explosives Safety Standards. All rocket motor transport, handling, and storage activities would be conducted in compliance with AFR 127-100.

If a rocket motor becomes damaged during transport or transfer operations, or in some other way becomes unstable, personnel from the Air Force Space and Missile Systems Center Space Test and Experimentation Systems Program Office and the Ogden Air Logistics Command Explosive Ordnance Disposal would remove the motor off Kirtland AFB for proper disposal. In the event of a mishap during motor transport, transfer, or storage that would require emergency response, procedures described in the RSLP emergency response guides for MMII and A-3 would be followed. These are discussed in more detail in Chapter 5.

One or more of three alternative transfer options could be used: Plant 4 in the Manzano Area, the overhead crane on Pennsylvania Avenue, or a mobile crane. Either the overhead crane or a mobile crane could be used to handle both the A-3 and MMII motors. However, because Plant 4 would not be

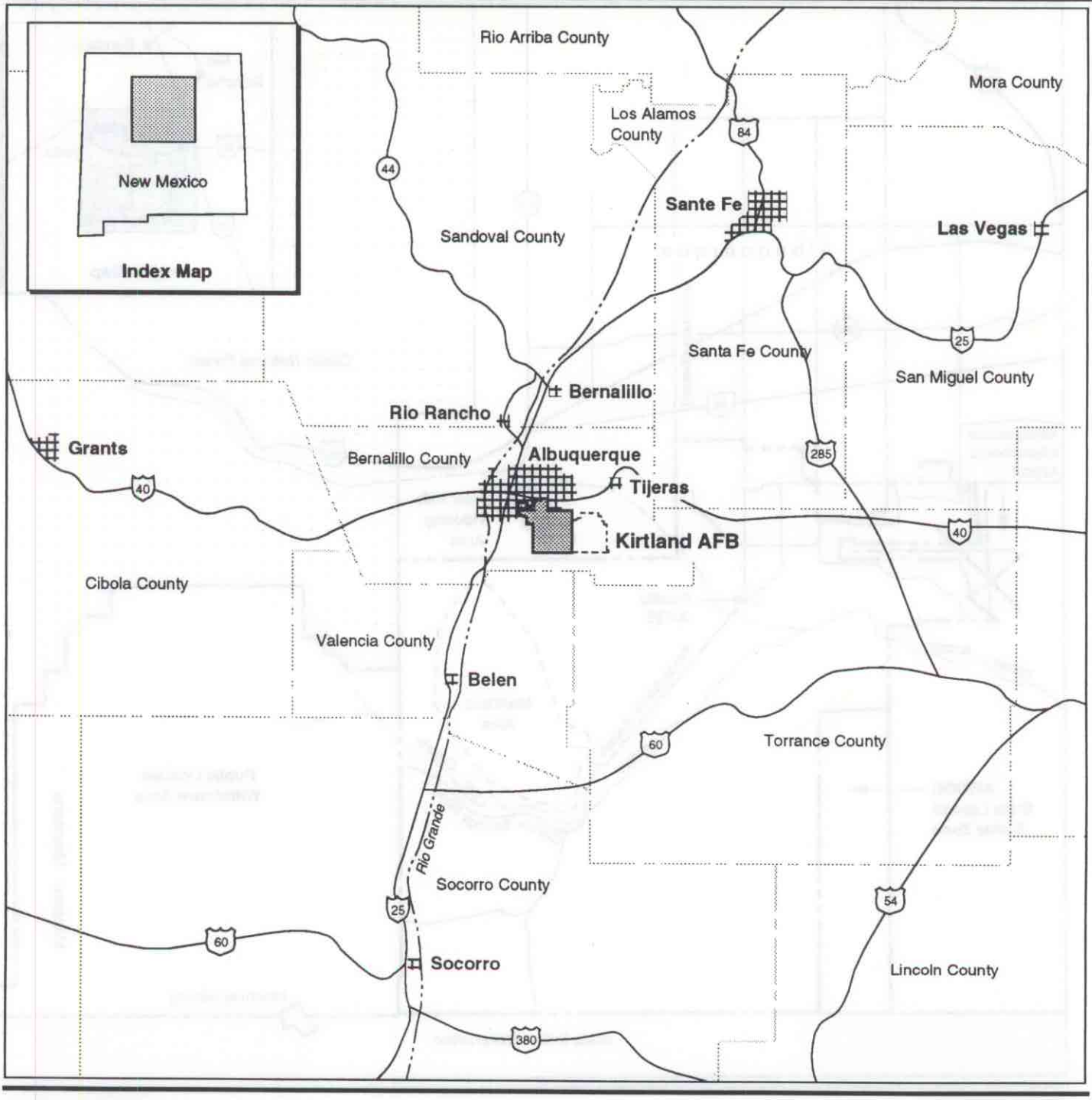
EXPLANATION

- Primary Transportation Route
- Secondary Transportation Route
- 80 Interstate Highway
- 101 U. S. Highway
- 74 State Highway

0 50 100 200 Miles

Transportation Routes to Kirtland Air Force Base

Figure 2.1-1



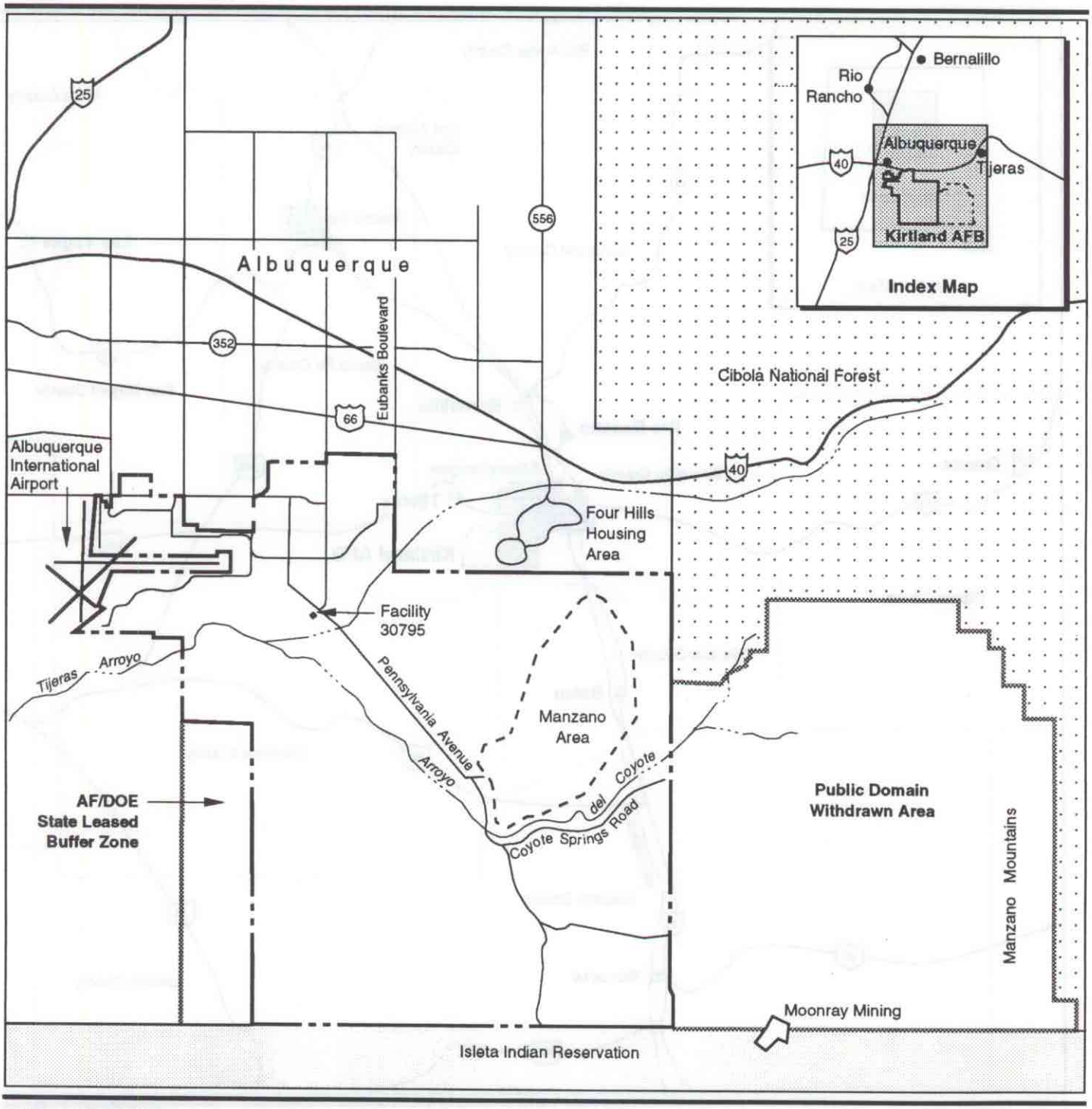
EXPLANATION

- Selected Urban Areas
- Kirtland AFB
- Kirtland AFB (Withdrawn Public Lands)
- 40 Interstate Highway
- 89 U. S. Highway
- 64 State Highway

0 5 10 20 Miles

Kirtland Air Force Base, New Mexico, Vicinity Map

Figure 2.1-2



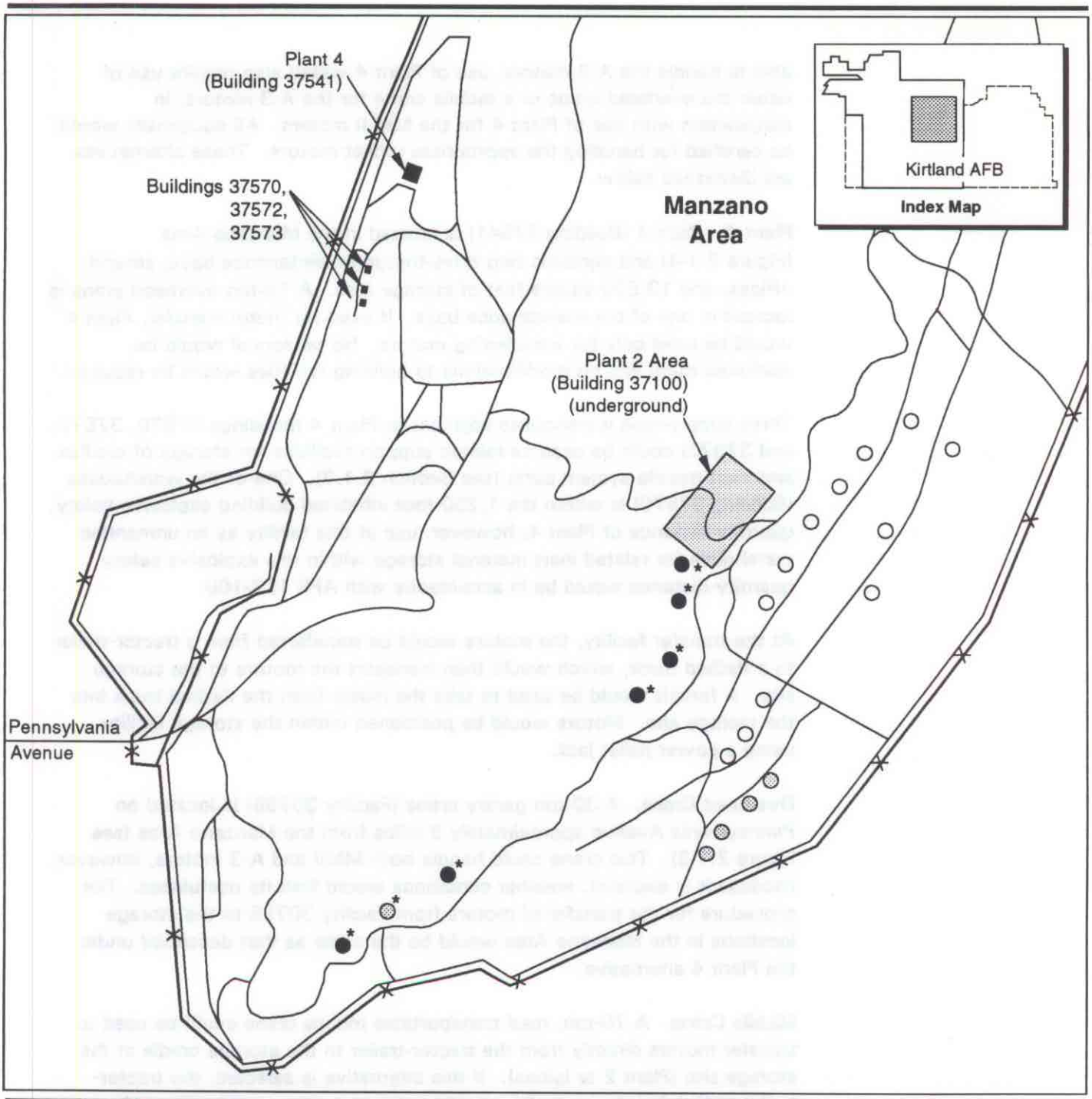
EXPLANATION

- Base Boundary
- Public Domain Withdrawn Areas (Kirtland AFB)
- 80 Interstate Highway
- 101 U. S. Highway
- 74 State Highway

0 .5 1 2 Miles

Base Map Kirtland Air Force Base

Figure 2.1-3



EXPLANATION

Multiple Fences

* Deep Bunkers
(others are earth-covered, aboveground)

Storage Igloos

- Type B
- Type C
- Type D

0 400 800 1600 Feet

Proposed RSLP Storage Sites, Manzano Area, Kirtland Air Force Base

Figure 2.1-4

able to handle the A-3 motors, use of Plant 4 would also require use of either the overhead crane or a mobile crane for the A-3 motors, in conjunction with use of Plant 4 for the MM II motors. All equipment would be certified for handling the appropriate rocket motors. These alternatives are discussed below.

Plant 4. Plant 4 (Building 37541) is located in the Manzano Area (Figure 2.1-4) and contains two drive-through maintenance bays, several offices, and 13,520 square feet of storage area. A 10-ton overhead crane is located in one of the maintenance bays. If used for motor transfer, Plant 4 would be used only for transferring motors. No personnel would be stationed there and no modifications to building facilities would be required.

Three supply-type warehouses adjacent to Plant 4 (Buildings 37570, 37572, and 37573) could be used as related support facilities for storage of cradles and inert missile system parts (see Section 2.1.3). One of the warehouses (Building 37570) is within the 1,250-foot inhabited building explosive safety quantity-distance of Plant 4; however, use of this facility as an unmanned warehouse for related inert material storage within this explosive safety quantity-distance would be in accordance with AFR 127-100.

At the transfer facility, the motors would be transferred from a tractor-trailer to a flatbed truck, which would then transport the motors to the storage site. A forklift would be used to take the motor from the flatbed truck into the storage site. Motors would be positioned within the storage facility using a power pallet jack.

Overhead Crane. A 30-ton gantry crane (Facility 30795) is located on Pennsylvania Avenue approximately 3 miles from the Manzano Area (see Figure 2.1-3). This crane could handle both MMII and A-3 motors; however, because it is exposed, weather conditions would limit its usefulness. The procedure for the transfer of motors from Facility 30795 to the storage locations in the Manzano Area would be the same as that described under the Plant 4 alternative.

Mobile Crane. A 70-ton, road transportable mobile crane could be used to transfer motors directly from the tractor-trailer to the storage cradle at the storage site (Plant 2 or igloos). If this alternative is selected, the tractor-trailer containing the motor(s) would be driven to the storage site and positioned in front of it. The motor would be transferred to an open trailer or onto a rail set. The mobile crane would then be used to transfer the motor to a storage cradle and the cradle containing the motor would be placed in the storage site using an air pallet or power pallet jack.

2.1.3 Storing Rocket Motors at Kirtland AFB

The RSLP rocket motors would be stored in facilities in the Manzano Area on Kirtland AFB. The Manzano Area is a fenced, limited access area where entry is controlled 24 hours a day.

Rocket motor storage screening criteria were applied to facilities in the Manzano Area to identify feasible storage locations. The exclusionary criteria for selecting acceptable storage facilities included the following:

- Facility structural design and condition
- Explosive safety distances
- A facility entrance elevation of 8 inches or less from grade, to facilitate loading motors into the igloo.

Additional operational efficiency criteria used to select acceptable storage facilities included the following:

- Minimize road travel from the motor transfer facility to the storage facilities.
- Minimize length of new electrical system distribution.
- Cluster facilities for efficient maintenance and surveillance.
- Cluster facilities to avoid proximity to non-RSLP explosives.

Of the facilities meeting these criteria at the Manzano Area, a maximum of 23 storage igloos and Plant 2 are proposed for storage.

Plant 2 (Building 37100) is an underground facility cut into Manzano Mountain. This facility is composed of several "storage rooms" connected by a series of long hallways or tunnels. Heating, air conditioning, and lighting have been installed and several of the rooms have grounding straps around the walls. Pending DOD Explosive Safety Board approval, the 250 MMII Stage II rocket motors would be stored here. No modifications to Plant 2 would be necessary.

MMII Stage III and A-3 Stage I motors would be stored in the igloos shown in Figure 2.1-4 and listed in Appendix B. MMII Stage III motors would be stored in Type B, C, and D igloos. Igloo types vary in dimensions, and approach tunnels and storage chambers are different sizes. Approximately seven of the Type C igloos would be required to store the A-3 motors. Of the igloos proposed for RSLP storage, seven igloos are deep bunkers built into the side of Manzano Mountain. The remaining 16 bunkers are

aboveground and earth-covered. Several of the igloos proposed to be used for RSLP show evidence of water intrusion with a potential for contribution to possible site contamination and require further evaluation. All igloos would be evaluated prior to use, and any found to be contaminated would not be used by the RSLP.

Storage of RSLP rocket motors at the Manzano Area would require an addition to or modification of existing Kirtland AFB contingency planning documentation.

Three supply-type warehouses adjacent to Plant 4 (Building 37570, 5,300 square feet; and Buildings 37572 and 37573, each approximately 5,000 square feet) (see Figure 2.1-4) could be used as supporting facilities for cradle storage or storage of inert missile system parts.

Operation of the facility would include storage of the motors, monitoring of temperature in the storage igloos, maintenance, and warehousing-oriented services. Approximately 5 to 12 new Air Force military and civilian personnel would be required to accomplish these activities at Kirtland AFB. If, during storage, a motor is damaged or in some other way becomes unstable or becomes excess and would not be used, personnel from the Air Force Space and Missile Systems Center Space Test and Experimentation Systems Program Office and the Ogden Air Logistics Command Explosive Ordnance Disposal would remove the motor off Kirtland AFB for proper disposal.

While in long-term storage, MMII Stage III motors may produce small amounts of an exudate containing nitroglycerin. This exudate would be cleaned from the motors periodically, using rags and a solution of sodium sulfite, alcohol, acetone, and water. The quantity of exudate produced per motor would vary, but would not exceed a few grams within a 6-month period. The used rags would be handled and disposed of as a hazardous waste. MMII Stage II and A-3 Stage I motors do not generate any hazardous waste.

Transfer activities and storing of the rocket motors would not entail any other use of hazardous materials or generation of hazardous wastes other than small quantities of materials, such as lubricants, required for use and maintenance of equipment (cranes, forklifts, and pallet jacks).

2.1.4 Facility Modifications at Kirtland AFB

Facility modifications at Kirtland AFB would occur at the aboveground storage igloos and at the motor transfer facility. The road system in the Manzano Area can accommodate the rocket motor transport vehicles without modification or repair.

Motor Transfer Facility. If Plant 4 is used as the motor transfer facility, approximately 200 cubic yards of soil would have to be removed, and two fire hydrants (one near the front entrance and one near the rear entrance) may have to be relocated to accommodate movement of the transporter in and out of the facility. The building heating system would require extensive repair or replacement.

Facility 30795 would not require any modifications for use as the motor transfer facility, although the crane may require refurbishment.

Storage Sites. The aboveground igloos to be used would require the following modifications:

- Removing the earth covering in order to apply waterproofing insulation and replacing the earth covering
- Installing electric heaters, grounding bar cables, and an energy monitoring system inside the igloos
- Grounding entry doors
- Repairing vents (if necessary).

Approximately 725 cubic yards of soil would be removed and replaced on each igloo during modification activities.

Also, additional electrical distribution to these igloos may be required for the electric heaters and energy monitoring system. If required, electrical distribution system upgrades would consist of replacing underground electrical lines that connect the igloos to secondary power transformers by trenching along these existing lines, and installing heavier electrical cables. The electrical transformers may also need to be replaced. No modifications to the existing overhead electrical distribution system would be made.

No modifications of the deep bunkers would be required for storage of the MMII Stage III motors, although the addition of electric heaters may be required. No utility upgrades would be required for these heaters.

Appropriate dust control, soil stabilization, and erosion control measures would be conducted on areas disturbed during facility and utility modifications to reduce fugitive dust emissions, and wind and water erosion of disturbed soils. The total disturbed area would vary depending on 1) the total number of igloos that would be modified, 2) if Plant 4 were to be used, and 3) if underground electrical lines were to be replaced. Because the maximum area that would be disturbed under the Proposed Action would total less than 5 acres, a National Pollutant Discharge Elimination System

(NPDES) permit for storm water discharges associated with construction activities would not be required.

However, if the total disturbed area exceeds 3/4 acre, a topsoil disturbance permit from the City of Albuquerque Environmental Health Department, Air Pollution Control Division would be required. This permit would require development and implementation of a dust control plan.

In the event that archaeological resources are unexpectedly uncovered during earth moving activities, these activities in the immediate area would cease, and a qualified archaeologist would be notified through the Kirtland AFB Environmental Management Division, Office of Special Projects.

2.2 ALTERNATIVES TO THE PROPOSED ACTION

Alternatives to the Proposed Action analyzed in this EA are the Camp Navajo Alternative, which involves the transport of A-3 solid rocket motors to and storage at Camp Navajo, and the No-Action Alternative.

2.2.1 Camp Navajo Alternative

The Camp Navajo Alternative is the transportation of A-3 Stage I rocket motors from SUBASE Bangor to Camp Navajo, and long-term storage at Camp Navajo. Both the transportation of MMII rocket motors from Hill AFB, Utah, and Pueblo Depot Activity, Colorado, to Camp Navajo, and the storage of MMII rocket motors at Camp Navajo have been previously documented as discussed in Section 1.3 and are not analyzed as part of this EA.

2.2.1.1 Transporting Rocket Motors to Camp Navajo. This portion of the Camp Navajo Alternative would be identical to the same activity under the Proposed Action except for the specific transportation routes used. Transportation routes from SUBASE Bangor to Camp Navajo, like those previously described for the Proposed Action, are truck routes. A primary and secondary route are described in the following paragraphs. Although the primary route is shorter, either route could be used.

SUBASE Bangor to Camp Navajo - Primary Transportation Route. The primary route to Camp Navajo is identical to the secondary route to Kirtland AFB as described in Section 2.1.1.2 except that it would end at Camp Navajo on Interstate 40 (Figure 2.2-1). This route is approximately 1,500 miles.

SUBASE Bangor to Camp Navajo - Secondary Transportation Route. The secondary route to Camp Navajo is the same as the primary route to Kirtland AFB as described in Section 2.1.1.1 except that at Mexican Water, Arizona, the tractor-trailer would travel southwest on U.S. 160 rather than continue south on U.S. 191. From U.S. 160 the route would continue to U.S. 89,

EXPLANATION

- Primary Transportation Route
- Secondary Transportation Route
- 80 Interstate Highway
- 101 U. S. Highway
- 74 State Highway

0 50 100 200 Miles

Transportation Routes to Camp Navajo

Figure 2.2-1

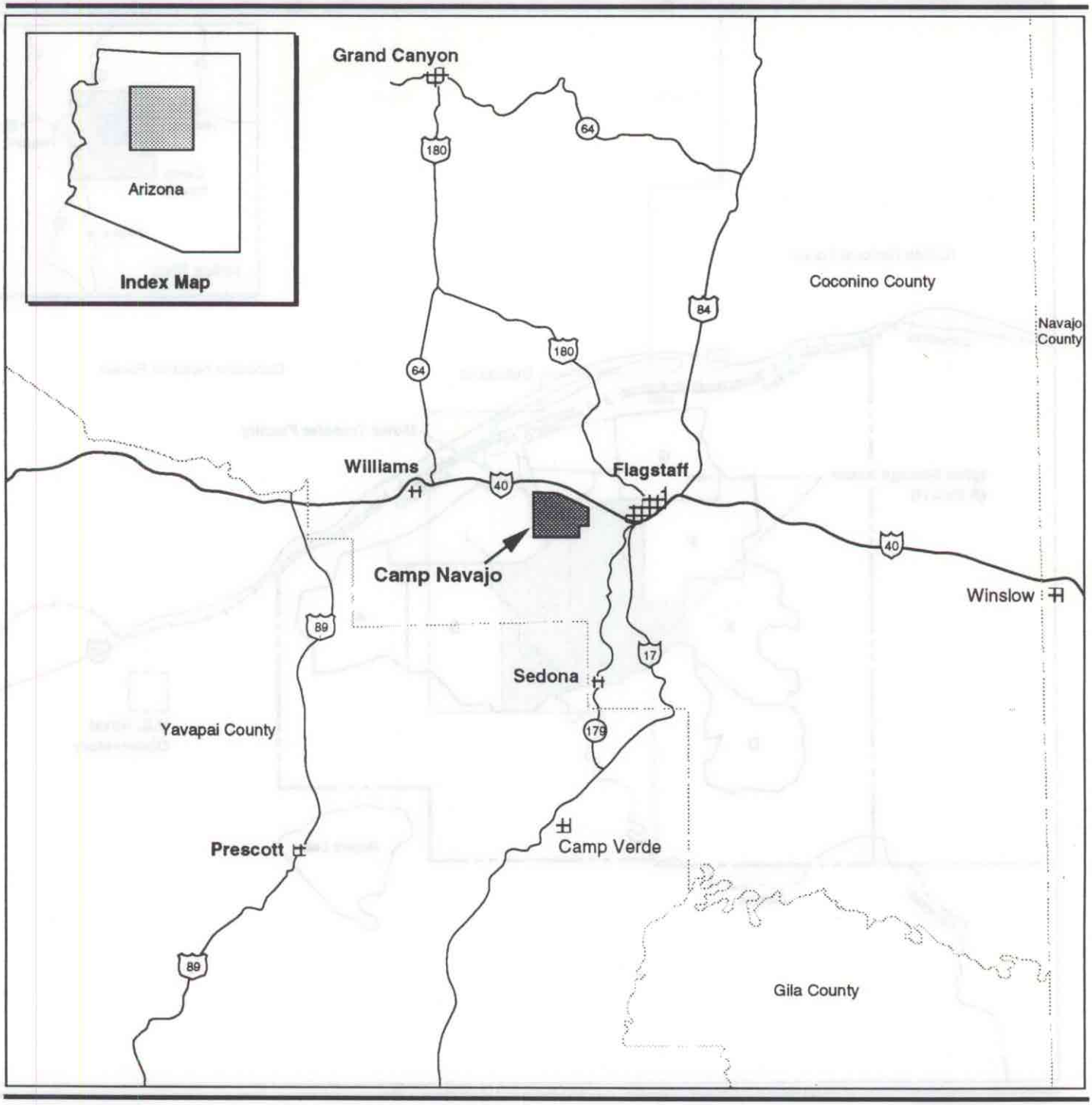
turn south on U.S. 89 to Interstate 40 at Flagstaff, and then west on Interstate 40 to Camp Navajo (see Figure 2.2-1). This route is approximately 1,630 miles.

2.2.1.2 Transferring Rocket Motors at Camp Navajo. Under the Camp Navajo Alternative, A-3 Stage I rocket motors would be transported to Camp Navajo for storage in igloo ammunition storage areas (Figures 2.2-2 and 2.2-3). Transfer activities at Camp Navajo would entail use of the motor transfer facility (Building 375), which was constructed to support the MMII motor storage effort. The motors would be transferred from the tractor-trailer to a specially designed, flatbed-type, depot transporter truck for transport to the storage igloos. The road system at Camp Navajo can support the depot transporter truck without modifications or repairs. All rocket motor transport, handling, and storage activities would be conducted in accordance with AFR 127-100, Army Materiel Command Regulation 385-100, Safety Manual, and Army Regulation (AR) 385-64, Ammunition and Explosive Safety Standards.

2.2.1.3 Storing Rocket Motors at Camp Navajo. A-3 Stage I solid rocket motors would be stored in standard, earth-covered igloos located in storage areas C or H at Camp Navajo (see Figure 2.2-3). A total of 136 igloos in these areas were found to meet the safety and operational criteria (see Section 2.1.3) for MMII storage. A maximum of 123 of these would be required to store MMII motors at Camp Navajo, and approximately seven would be required for A-3 storage. The igloo storage areas at Camp Navajo are fenced, have limited access, and entry is controlled 24 hours a day. All igloos would be sited for 250,000 pounds net explosive weight after undergoing modifications (see Section 2.2.1.4), which exceeds the practical storage capacity; all igloos are separated from each other by at least 400 feet (U.S. Air Force, 1992a). Inert A-3 missile system parts would be stored in standard magazines designated for inert storage.

Existing MMII storage staff would be used for storage of A-3 motors at Camp Navajo and no additional personnel would be required. An addendum to the existing explosive site safety plan would be prepared for storage of the A-3 motors at the installation. As under the Proposed Action, emergency response guide procedures would be followed in the event of a mishap during motor transport, transfer, or storage as discussed in Chapter 5.

2.2.1.4 Facility Modifications at Camp Navajo. Facility modifications are required for the A-3 storage igloos. No facility modifications or construction are required for A-3 motor transfer operations at Camp Navajo.



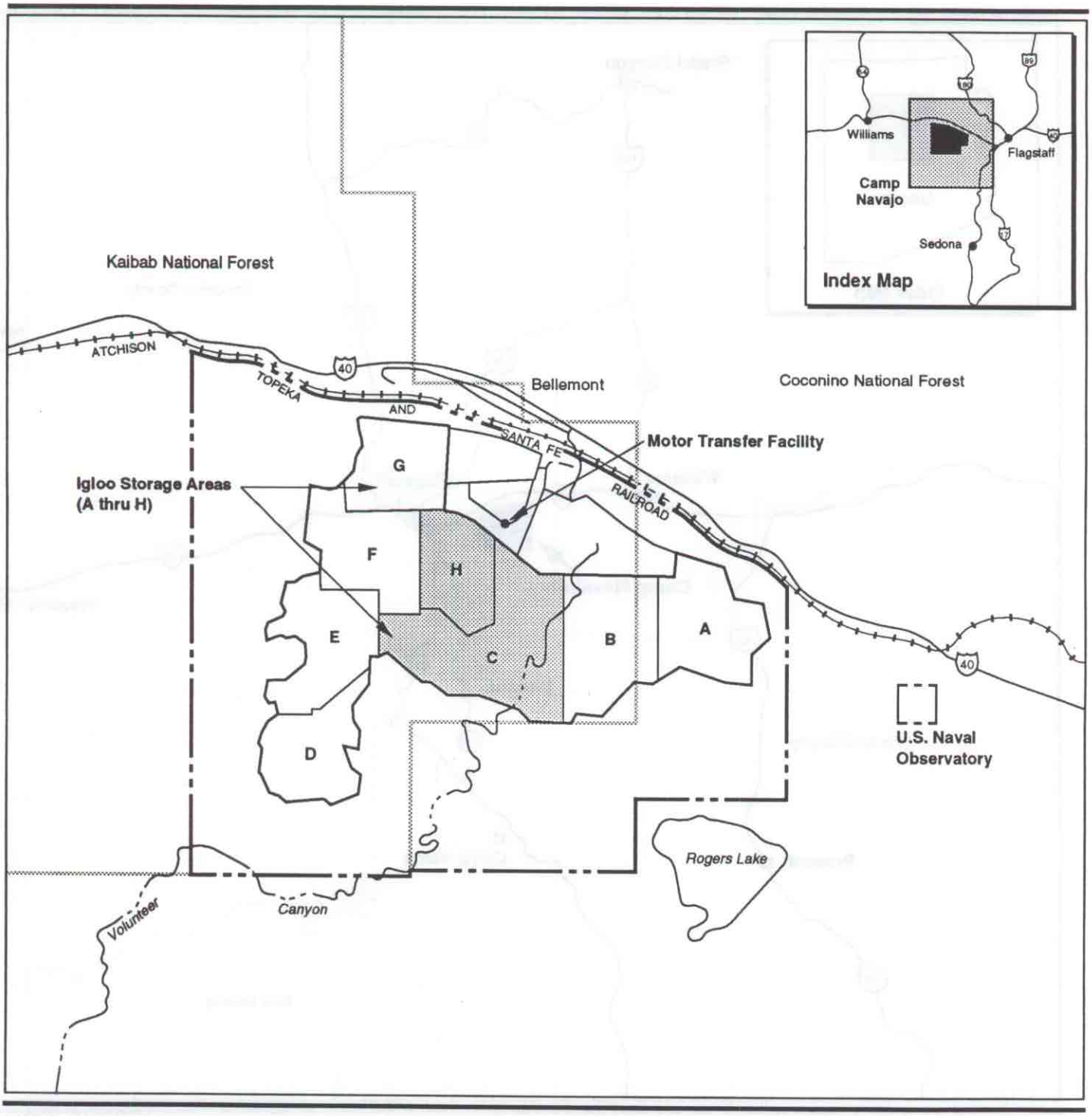
EXPLANATION

- Selected Urban Areas
- Camp Navajo
- 40 Interstate Highway
- 89 U. S. Highway
- 64 State Highway

0 5 10 20 Miles

Camp Navajo Arizona, Vicinity Map

Figure 2.2-2



EXPLANATION

- Base Boundary
- National Forest Boundary
- Interstate Highway
- Igloo Storage Areas Proposed for RSLP Rocket Motor Storage

0 .5 1 2 Miles

Base Map Camp Navajo

Figure 2.2-3

Igloo modifications would involve the following:

- Removing the earth covering in order to apply waterproofing insulation, and replacing the earth covering
- Installing electric heaters, lights, grounding bar cables, lightning arrestor systems, and an energy monitoring system
- Enlarging and grounding entry doors
- Refinishing or replacing floors and entry aprons
- Repairing vents (if necessary).

Approximately 725 cubic yards of soil would be removed to apply insulation to each igloo, and approximately 150 cubic yards of soil would be removed to modify the apron in front of each igloo. All of these areas were heavily disturbed during the original construction of the igloos.

Installing the electric heaters would require that additional electrical distribution be provided to these igloos. Electrical distribution to the igloos would be via an aboveground distribution system. Utility poles would be located adjacent to the existing igloo road system. Power would be supplied to each igloo via an electric cable placed in a trench extending approximately 80 feet from a utility pole, passing under the roadway to the igloo. Electrical distribution upgrades for the MMII storage effort are in progress in Igloo Storage Area H. Under the Camp Navajo Alternative, these upgrades would be extended to include the seven A-3 storage igloos.

The electrical distribution system would use a raptor-safe pole design that would not present an electrocution hazard to large birds of prey.

Appropriate dust control, soil stabilization, and erosion control measures would be conducted on areas disturbed during igloo and utility modifications to reduce fugitive dust emissions, and wind and water erosion of disturbed soils as required. Because the total area disturbed would be less than 5 acres, an NPDES permit for storm water discharges associated with construction activities would not be required.

Procedures for protection of cultural resources that may unexpectedly be discovered during earth-moving activities associated with storage of A-3 motors at Camp Navajo would be those outlined in the MMII Storage EA (U.S. Air Force, 1992a) as described in Section 4.3.2 of this EA.

2.2.2 No-Action Alternative

The No-Action Alternative is to leave the rocket motors in their present locations (see Table 2.1-1).

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED

A study conducted for the U.S. Air Force to evaluate 20 locations for rocket motor storage identified Camp Navajo as the only feasible storage location. The other 19 locations and the reasons for their elimination are shown in Table 2.3-1. The methodology and criteria used in the study are referenced in the MMII Storage EA (U.S. Air Force, 1992a). Kirtland AFB was not considered as a potential storage site when the study was conducted, because at that time the Manzano Area facilities at Kirtland AFB had another mission.

Transport of the A-3 motors by air or rail was not considered. The motors can be transported by tractor-pulled trailers, but no air- or rail-certified containers have been designed for the shipment of individual motors. The trailers containing the motors cannot be shipped by air or rail because tie-down devices to secure the trailers for air or rail transportation have not been designed (U.S. Air Force, 1992b).

2.4 COMPARISON OF ENVIRONMENTAL IMPACTS

This section presents a summary comparison of potential environmental impacts resulting from implementation of the Proposed Action and the Camp Navajo and No-Action alternatives (Table 2.4-1). As previously discussed, the Proposed Action is defined as storage of MMII and transport and storage of A-3 motors at Kirtland AFB. The Camp Navajo Alternative includes only transport and storage of A-3 motors. For this reason, the table is split into two separate comparisons: MMII motor storage at Kirtland AFB and the No-Action Alternative; and A-3 motor transport to and storage at Kirtland AFB, the Camp Navajo Alternative, and the No-Action Alternative. More detailed discussions of potential impacts are presented in Chapter 4. The potential environmental impacts of the transportation of MMII motors to both Kirtland AFB and Camp Navajo, and their storage at Camp Navajo are presented in previous environmental documentation as discussed in Section 1.3. These potential environmental impacts are summarized in the Findings of No Significant Impacts for these EAs, copies of which are provided in Appendix A of this EA.

Table 2.3-1. Sites Eliminated from Consideration as Rocket Motor Storage Locations

Location	Site Screening Criteria							
	Full	Inadequate Access to Igloos for Minuteman II Storage	Igloos Eliminated	Igloos Too Small, Insufficient Explosive Limit	Local Zoning and Site Restrictions	Inadequate Capacity	Igloos in Poor Physical Condition	Facilities to be Closed Under P.L. 100-526 (BRAC)
March AFB, CA			X					
Edwards AFB, CA	X							
Naval Weapons Center, China Lake, CA	X							
Sunflower Army Ammunition Plant, KS				X				
Aerojet Solid Propellant Co., CA					X			
Thiokol Corp., Brigham City, UT						X		
Hercules, Inc., Magna, UT						X		
Fort Wingate Depot Activity, NM								X
Hill AFB, UT	X							
Highland Industrial Park, Camden, AR							X	
Naval Weapons Support Center, Crane, IN	X	X						
Green River Launch Complex, Moab, UT						X		
Hawthorne Army Ammunition Plant, NV	X							
Longhorn Army Ammunition Plant, TX								X
McAlester Army Ammunition Plant, OK								X
Naval Industrial Reserve Plant, TX						X		
Pueblo Depot Activity, Pueblo, CO								X
Tooele Army Depot, Tooele, UT	X							
Umatilla Depot Activity, Umatilla, OR								X

BRAC = Base Realignment and Closure Act.
P.L. = Public Law.

Table 2.4-1. Potential Impacts of Alternatives
Page 1 of 4

	Storage of MMII Motors		Transport and Storage of A-3 Motors		
Resource	Proposed Action	No-Action	Proposed Action	Camp Navajo Alternative	No-Action
Air Quality	Impacts: Fugitive dust and heavy construction equipment exhaust associated with earth movement at Plant 4, electrical distribution system upgrades, and igloo modifications; vehicle exhaust associated with local motor transport and additional personnel. Temporary and insignificant impact to base and regional air quality	Impacts: None	Impacts: Fugitive dust and heavy construction equipment exhaust associated with electrical distribution system upgrades and igloo modifications; vehicle exhaust associated with local motor transport and additional personnel. Temporary and insignificant impact to base and regional air quality	Impacts: Fugitive dust and heavy construction equipment exhaust associated with electrical distribution system upgrades and igloo modifications; vehicle exhaust associated with local motor transport. Temporary and insignificant impact to base and regional air quality	Impacts: None
	Mitigations: Dust control measures to be used during ground disturbing activities	Mitigations: None	Mitigations: Dust control measures to be used during ground disturbing activities	Mitigations: Dust control measures to be used during ground disturbing activities	Mitigations: None
Biological Resources	Impacts: Ground disturbing activities associated with Plant 4 modifications, electrical distribution system upgrades, and igloo modifications. No significant impacts to biological resources expected	Impacts: None	Impacts: Ground disturbing activities associated with electrical distribution system upgrades and igloo modifications. No significant impacts to biological resources expected	Impacts: Ground disturbing activities associated with electrical distribution system upgrades and igloo modifications. Installation of overhead electrical distribution system presents potential electrocution hazard to large birds of prey. No significant impacts to biological resources expected	Impacts: None

A-3 = Polaris missile system.
MMII = Minuteman II.

Table 2.4-1. Potential Impacts of Alternatives
Page 2 of 4

Resource	Storage of MMII Motors		Transport and Storage of A-3 Motors		
	Proposed Action	No-Action	Proposed Action	Camp Navajo Alternative	No-Action
Biological Resources (Continued)	Mitigations:	Mitigations:	Mitigations:	Mitigations:	Mitigations:
	None	None	None	Raptor-safe pole design would be used on overhead electrical distribution system.	None
Cultural Resources	Impacts:	Impacts:	Impacts:	Impacts:	Impacts:
	Modifications to igloos, ground-disturbing activities at Plant 4, and ground disturbance associated with electrical distribution system upgrades. No adverse effects to historic buildings or to archaeological resources are expected	None	Modifications to igloos. Ground disturbance associated with electrical distribution system upgrades. No adverse effects to historic buildings or to archaeological resources are expected	Modifications to igloos. Ground-disturbing activities at igloos and for electrical distribution system upgrades. No adverse effects to historic buildings or to archaeological resources are expected	None
	Mitigations:	Mitigations:	Mitigations:	Mitigations:	Mitigations:
	Cease activities and notify archaeologist in the event cultural materials are unexpectedly discovered during earth-disturbing activities	None	Cease activities and notify archaeologist in event cultural materials are unexpectedly discovered during earth-disturbing activities	Continue procedures developed in consultation with Arizona SHPO for protection of cultural resources for storage of MMII rocket motors at Camp Navajo	None

A-3 = Polaris missile system.
MMII = Minuteman II.
SHPO = State Historic Preservation Officer.

Table 2.4-1. Potential Impacts of Alternatives
Page 3 of 4

Resource	Storage of MMII Motors		Transport and Storage of A-3 Motors		
	Proposed Action	No-Action	Proposed Action	Camp Navajo Alternative	No-Action
Hazardous Materials/ Waste Management	Impacts: Hazardous materials/waste associated with operation of heavy construction equipment and motor transport vehicles; potential for disturbance of sites contaminated with hazardous wastes at Plant 4; potentially contaminated igloos; hazardous waste generated by MMII Stage III motors; and possible replacement of PCB-contaminated equipment. No significant impacts to hazardous materials/waste management Mitigations: Igloos would be evaluated for hazardous waste contamination prior to use for RSLP	Impacts: None Mitigations: None	Impacts: Hazardous materials/waste associated with operation of heavy construction equipment and motor transport vehicles; potentially contaminated igloos; and possible replacement of PCB-contaminated equipment. Plant 4 would not be used for A-3 motors. No significant impacts to hazardous materials/waste management Mitigations: Igloos would be evaluated for hazardous waste contamination prior to use for RSLP	Impacts: Hazardous materials/waste associated with operation of heavy construction equipment and motor transport vehicles. No significant impacts to hazardous materials/waste management Mitigations: None	Impacts: None Mitigations: None
Utilities	Impacts: Increased demands on infrastructure from additional 5-12 personnel, and operation of transfer facility and storage igloos. Upgrades to electrical distribution to igloos required. Increased demands are insignificant	Impacts: None	Impacts: Increased demands on infrastructure from additional 5-12 personnel, and operation of transfer facility and storage igloos. Upgrades to electrical distribution to igloos required. Increased demands are insignificant	Impacts: Increased demands on infrastructure from operation of storage igloos. Upgrades to electrical distribution system to igloos required. Increased demands are insignificant	Impacts: None

A-3 = Polaris missile system.
MMII = Minuteman II.
PCB = polychlorinated biphenyl.
RSLP = Rocket Systems Launch Program.

Table 2.4-1. Potential Impacts of Alternatives
Page 4 of 4

Resource	Storage of MMII Motors		Transport and Storage of A-3 Motors		
	Proposed Action	No-Action	Proposed Action	Camp Navajo Alternative	No-Action
Utilities (Continued)	Mitigations:	Mitigations:	Mitigations:	Mitigations:	Mitigations:
	None	None	None	None	None
Water Resources	Impacts:	Impacts:	Impacts:	Impacts:	Impacts:
	Increased demand on aquifer because of additional personnel, potential for hazardous material/waste spill to affect groundwater, erosional impacts to surface drainage systems. Additional water supply demand and potential for hazardous spill are insignificant	None	Increased demand on aquifer because of additional personnel, potential for hazardous material/waste spill to affect groundwater, erosional impacts to surface drainage systems. Additional water supply demand and potential for hazardous spill are insignificant	Potential for hazardous material/waste spill to affect groundwater, erosional impacts to surface drainage. No increased use of water due to personnel increases at Camp Navajo. Potential for hazardous spill to affect groundwater is insignificant	None
	Mitigations:	Mitigations:	Mitigations:	Mitigations:	Mitigations:
	Erosion control measures to limit water erosion of disturbed soils	None	Erosion control measures to limit water erosion of disturbed soils	Erosion control measures to limit water erosion of disturbed soils	None

A-3 = Polaris missile system.
MMII = Minuteman II.

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3.0 AFFECTED ENVIRONMENT

This chapter describes the location, history, and current mission of Kirtland AFB and Camp Navajo and the environmental setting of the installations in order to provide a basis for evaluating the potential impacts presented by implementation of the Proposed Action and alternatives.

The environmental resources discussed in Section 3.2, Environmental Setting, are those determined to have the potential to be affected at that location based on the operational characterization of the Proposed Action and alternatives. Resources along the transportation routes, except for hazardous materials/waste management, are not covered in this chapter (see Section 1.3.1).

3.1 LOCATION, HISTORY, AND CURRENT MISSION OF THE INSTALLATIONS

3.1.1 Kirtland AFB

3.1.1.1 Location. Kirtland AFB is located in Bernalillo County in north-central New Mexico. The primary community near Kirtland AFB is the city of Albuquerque to the northwest. The population of the Albuquerque Metropolitan Statistical Area in 1990 was estimated at 481,000 (U.S. Bureau of the Census, 1991). The base and the Albuquerque International Airport jointly use the runway facilities. Kirtland AFB covers an area of approximately 52,681 acres, including fee-owned, withdrawn public domain lands, and easements. The Air Force controls 44,018 acres, the Department of Energy (DOE) controls 7,522 acres, and the city of Albuquerque owns 1,141 acres, including 1,110 acres of runways/taxiways.

Kirtland AFB and the non-DOD tenant units employed approximately 20,270 personnel, including contractors, at the end of fiscal year 1992.

3.1.1.2 History. Kirtland AFB began as a private airfield built in the 1920s. It was named after Colonel Roy C. Kirtland, a military aviation pioneer, who learned to fly with the Wright brothers. In the late 1930s and early 1940s, the municipal airport for Albuquerque was converted into two military complexes: Kirtland Air Field was established in 1939, and the Sandia facility in 1942. The Sandia Corporation (now Sandia National Laboratories) was placed at Sandia Base, now on the eastern side of Kirtland AFB. Manzano Base was constructed in the late 1940s as an annex to Sandia Base. In 1948, Kirtland Air Field was renamed Kirtland AFB. In 1971, Sandia Base and Manzano Base were merged with Kirtland AFB.

3.1.1.3 Current Mission. The 377th Air Base Wing is the host wing, and provides support to Kirtland AFB tenants. Support functions include medical care, housing, civil engineering, fire protection, administrative support,

personnel services, legal assistance, transportation, security, law enforcement, accounting, and funds management. The base's major missions include the 542 Crew Training Wing (CTW) and Phillips Laboratory. The 542 CTW conducts the specialized training school for all Air Force helicopter crew members. The wing also provides basic and advanced pararescue qualification training. The Phillips Laboratory, under the command of the Air Force Space and Missile Systems Center, directs research activities at Kirtland AFB, Hanscom AFB, and Edwards AFB. The mission of Phillips Laboratory is to conduct research and develop technology for space systems, ballistic missiles, geophysics, and directed energy systems for the Air Force.

The DOE's Albuquerque Operations Office and their prime contractor, the Sandia National Laboratories, conduct research and development, testing, stockpile surveillance, and the transportation of nuclear materials.

3.1.2 Camp Navajo

3.1.2.1 Location. Camp Navajo occupies 28,428 acres of land in north-central Arizona. Camp Navajo is located in the town of Bellemont, in rural Coconino County, approximately 12 miles west of the city of Flagstaff. The estimated population of Coconino County in 1993 was 104,700. Interstate Route 40 and the Atchison, Topeka & Santa Fe Railway parallel the northern boundary and provide transportation access to this fenced facility. Some private and commercial land is found along this northern boundary. Land to the east, south, and west is primarily national forest or is owned by the state of Arizona. Camp Navajo employs approximately 115 personnel, and approximately 400 people reside on the installation (the majority of installation housing is currently subleased).

3.1.2.2 History. Camp Navajo was established by the purchase of privately owned land and the transfer of forest lands from the Kaibab and Coconino national forests. Activation of the Navajo Ordnance Depot took place on July 1, 1942. The Navajo Ordnance Depot became a backup facility for the Erie Ordnance Depot and later the Benicia California Arsenal. From early 1945 to the end of World War II, the depot served as a prisoner-of-war camp for Austrian soldiers.

In 1953, new buildings were constructed to accommodate the newly assigned mission to receive, store, and issue General Services Administration material.

The depot was assigned a Defense Supply Agency Depot mission in February 1967. At the same time, the installation was assigned a mission of storing Air Force fire bombs and related fuzing components. In March 1971, the Navajo Army Depot was placed under reserve status and redesignated as Navajo Depot Activity under the command of the Pueblo

Army Depot. In 1975 the installation was reassigned to the command of the Tooele Army Depot in Tooele, Utah. In July 1982, operational control of Navajo Depot Activity was transferred to the Arizona National Guard under license from the Secretary of the Army. Under the Base Realignment and Closure Act of 1988 (P.L. 100-526), the installation was completely separated from the Army in October 1993 and renamed Camp Navajo.

3.1.2.3 Current Mission. Under the Base Realignment and Closure Act, the installation's mission to operate as a reserve supply depot for the receipt, storage, surveillance, motor maintenance, and demilitarization of ammunition and assigned commodities, and shipping of ammunition is being phased out.

Camp Navajo is a major training area for the Arizona National Guard and is also a training site for the Southern Sixth Army and the Arizona Military Academy. The training mission provides facilities, ranges, and training opportunities that enhance the readiness of the Arizona National Guard and other reserve component units training at Camp Navajo. The Camp Navajo training mission results in the qualification of soldiers in military occupational specialties as well as training of noncommissioned and commissioned officers. In addition, a certified ammunition school is located at the camp.

The Arizona National Guard proposes to continue using the existing storage space on the installation for varied DOD storage missions such as MMII rocket motors, which has already commenced under the RSLP.

3.2 ENVIRONMENTAL SETTING

Existing conditions for air quality, biological resources, cultural resources, utilities, and water resources at Kirtland AFB and Camp Navajo, and for hazardous materials and waste management at both locations and along the transportation corridors, are discussed in the following sections.

3.2.1 Air Quality

Air quality in a given location is described by the concentration of various pollutants in the atmosphere. The proposed project would emit air pollutants with the potential to affect air quality both during construction (e.g., from construction vehicles and soil disturbance) and operations (e.g., from transportation vehicles) phases. The federal Clean Air Act dictates that project emission sources must comply with air quality standards and regulations established by federal, state, and county regulatory agencies.

Federal standards are established by the U.S. Environmental Protection Agency (EPA) and termed the National Ambient Air Quality Standards (NAAQS) (Table 3.2-1).

Table 3.2-1. National, New Mexico, and Albuquerque/Bernalillo County Ambient Air Quality Standards

Pollutant	Federal Primary Standards	Federal Secondary Standards	New Mexico Standards[a]	Albuquerque/Bernalillo County Standards[b]
Ozone[c]				
1-hour average (daily)	0.12 ppm	0.12 ppm	---	---
Photochemical oxidants				
1-hour average	---	---	0.06 ppm	0.01 ppm
Carbon monoxide				
Annual average	---	---	---	4 ppm
8-hour average	9 ppm[d]	---	8.7 ppm	---
1-hour average	35 ppm[d]	---	13.1 ppm	13 ppm [d]
Nitrogen dioxide				
Annual arithmetic average	0.053 ppm	0.053 ppm	0.05 ppm	100 $\mu g/m^3$[e]
24-hour average	---	---	0.10 ppm	117 $\mu g/m^3$[e]
Sulfur dioxide				
Annual arithmetic average	0.03 ppm	---	0.02 ppm	0.004 ppm
24-hour average	0.14 ppm[d]	---	0.10 ppm	0.032 ppm
3-hour average	---	0.50 ppm[d]	---	---
Total suspended particulates				
Annual geometric mean	---[f]	---[f]	60 $\mu g/m^3$[g]	60 $\mu g/m^3$
30-day average	---	---	90 $\mu g/m^3$	---
7-day average	---	---	110 $\mu g/m^3$	---
24-hour average	---	---	150 $\mu g/m^3$	150 $\mu g/m^3$
PM_{10}				
Annual arithmetic mean	50 $\mu g/m^3$[f]	50 $\mu g/m^3$	---	---
24-hour average	150 $\mu g/m^3$	150 $\mu g/m^3$	---	---
Lead				
Calendar quarter arithmetic average	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	---	---
30-day average	---	---	---	3 $\mu g/m^3$

Notes:
(a) New Mexico reserves the right to relax these standards in specific localities for specific reasons. New Mexico has also established standards for hydrogen sulfide, total reduced sulfur, non-methane hydrocarbons, and soiling index (coefficient of haze).
(b) Albuquerque/Bernalillo County has also established standards for arsenic, copper and zinc, beryllium, non-methane hydrocarbons, hydrogen sulfide, soiling index, and total reduced sulfur.
(c) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is equal to or less than 1, as determined according to Appendix H of the ozone NAAQS.
(d) Not to be exceeded more than once per year.
(e) For Albuquerque/Bernalillo County, nitrogen dioxide standards are annual arithmetic mean and 24-hour mean, not averages.
(f) Total suspended particulates were the indicator pollutant for the original particulate matter (PM) standards. The federal standard has been replaced with the new PM_{10} standard and it is no longer in effect. New PM_{10} standards were promulgated in 1987, using PM_{10} as the new indicator pollutant. The annual standard is attained when the expected annual arithmetic mean concentration is less than or equal to 50 $\mu g/m^3$; the 24-hour standard is attained when the expected number of days per calendar year above 150 $\mu g/m^3$ is equal to or less than 1, as determined according to Appendix K of the PM NAAQS.
(g) New Mexico has also established additional standards if one or more of beryllium, asbestos, or heavy metals are present in the total suspended particulates, based on 30-day averages.
--- No standard established.

$\mu g/m^3$ = micrograms per cubic meter.
NAAQS = National Ambient Air Quality Standards.
PM_{10} = particulate matter equal to or less than 10 microns in diameter.
ppm = parts per million.

Sources: 40 Code of Federal Regulations Part 50; New Mexico Environmental Improvement Board Ambient Air Quality Standards and Air Quality Control Regulations, Section 201; and Ambient Air Quality Standards and Air Quality Control Regulations for Albuquerque/Bernalillo County.

3.2.1.1 Kirtland AFB

Climate. The climate of the Albuquerque and Kirtland AFB region is dry and continental. Monthly mean temperature ranges from 33 degrees Fahrenheit (°F) in January to 79°F in July with an annual average of 57°F. Annual precipitation averages 8 inches and primarily occurs between June and September as brief, yet sometimes heavy, thunderstorms. Snowfall generally occurs between December and March and averages approximately 10 inches annually. The average relative humidity ranges from 16 to 69 percent. The base is located in the broad Rio Grande Valley between two ranges of mountains that greatly modify area weather. The Sandia and Manzano mountains on the east side of the valley influence air dispersion patterns; during winter, they shelter the Albuquerque area from frigid winds that sweep from the plains to the east. Winds at Albuquerque International Airport blow most frequently from the north, north-northwest, and the east, with the strongest winds (21 knots or more) generally from the east (U.S. Air Force, 1991). Calm wind conditions occur most frequently during the winter months in the area. Under low wind conditions, mixing is reduced and local pollutant concentrations can increase.

Regional Air Quality. The air quality region of influence (ROI) is defined by the Albuquerque/Bernalillo County Air Quality Control District, which is jointly administered by the Albuquerque Environmental Health Department, Air Pollution Division, and the Bernalillo County Environmental Health Department. Under Albuquerque/Bernalillo County Air Quality Control Board regulations, all activities resulting in soil disturbance exceeding 3/4 acre are required to have a topsoil disturbance permit. This permit requires development and implementation of a dust control plan. National, New Mexico, and Albuquerque/Bernalillo County ambient air quality standards are listed in Table 3.2-1.

Albuquerque is designated by the U.S. EPA as being in nonattainment of carbon monoxide NAAQS. The area is classified as being in moderate nonattainment for carbon monoxide. An area that is in nonattainment must be covered by a State Implementation Plan that satisfies federal requirements with control measures adequate to achieve attainment within specified deadlines (Clean Air Act, Section 110). For carbon monoxide, these controls mainly apply to automotive inspection and maintenance programs, oxygenated fuel requirements, and transportation control measures. In addition, the Albuquerque Environmental Health Department, Air Pollution Control Division, implements "no-burn nights" during the winter months, restricting the use of wood-burning fireplaces and stoves during inversion conditions.

The primary sources of air emissions at Kirtland AFB include privately owned and military vehicles, aircraft, domestic heating, and fuel evaporation losses (U.S. Air Force, 1991).

3.2.1.2 Camp Navajo

Climate. The semiarid climate of the Flagstaff area, including Camp Navajo, is characterized by cold winters, mild summers, and a considerable diurnal temperature change. Monthly mean temperatures range from 28°F in January to 66°F in July, with an annual average of 45°F (Ebasco Environmental, 1990). The prevailing wind direction is south-southwest, with an average speed of 7 miles per hour.

The months of greatest precipitation are July, August, and December. The average yearly rainfall is 20 inches, and the average annual snowfall is 82 inches. When the heavy accumulation of snow melts in the mountains, occasional flooding of lowland areas results. Due to the dry climate, evaporation is significant, accounting for water losses of 60 inches per year from exposed storage.

Regional Air Quality. Due to atmospheric conditions and favorable air circulation patterns in the area, discharged air pollutants are readily dispersed. This is reflected in the low level of pollutant concentrations that have been recorded in the vicinity for several years. There are no land uses in the national forests surrounding the installation that generate pollutants.

The only air pollution sources at Camp Navajo are explosive demolition, boilers, one generator, and slash burning in conjunction with logging operations. All such sources are covered by permits issued by the Arizona Department of Environmental Quality. Permits are issued on a case-by-case basis after evaluation by the department.

Coconino County is in the U.S. EPA Northern Arizona Intrastate air quality control region, currently in compliance with current or expected standards (attainment status) for priority pollutants under the U.S. EPA Prevention of Significant Deterioration program. The region is designated Prevention of Significant Deterioration Class I for particulate matter and Class III for all other priority pollutants. The Arizona Department of Environmental Quality is the local enforcement agency; Coconino County also has enforcement authority over local air pollution control regulations. The state follows federal standards for evaluating new pollution sources.

Camp Navajo submitted a Resource Conservation and Recovery Act (RCRA) Part B permit application to the U.S. EPA on November 7, 1988 for open burning and open detonation in accordance with RCRA regulations. Currently, open burning is no longer conducted and open detonation is conducted under an interim status designation. However, all open detonation is expected to be completed by September 1994.

3.2.2 Biological Resources

Biological resources include the native and introduced plants and animals in the project area and those in adjacent areas that could be affected by the Proposed Action and Camp Navajo Alternative.

The ROI for biological resources is limited to those areas that would be affected by ground-disturbing activities or subsequent operations. To provide context, some regional aspects of vegetation and wildlife are also discussed.

3.2.2.1 Kirtland AFB

The ROI for biological resources at Kirtland AFB is the vicinity of the igloos in the southeast part of the Manzano Area, the vicinity of Plant 4 on the west side of the Manzano Area, and the vicinity of Facility 30795 on Pennsylvania Avenue.

Vegetation. Vegetation at Kirtland AFB can be classified in two ecological associations. A desert grassland association is prevalent over most of the base area, and a pinon-juniper association is present at elevations above 5,800 feet. Junipers (*Juniperus* sp.) grow on the north and east sides of Manzano Mountain, but are largely absent on the south and west sides. The ROI for biological resources is within the desert grassland association. This grassland association can contain more than 50 species of grasses, predominated by black grama (*Bouteloua eripoda*). Other common species are galleta grass (*Hilaria rigida*), sand drop-seed (*Sporobolus cryptandrus*), sand muhly (*Muhlenbergia* sp.), three-awn grasses (*Aristida* sp.), sand sage (*Artemisia filifolia*), and four-wing salt brush (*Atriplex canescens*) (U.S. Air Force, 1991).

The area adjacent to Plant 4, which would be disturbed as part of facility modifications, has been disturbed and contains some areas of sparse vegetation. Facility 30795 is located on a previously disturbed, weedy site.

Wildlife. An abundance of herbivores are associated with extensive grassland habitat on base. In areas of native vegetation, dominant herbivores include the desert cottontail *(Sylvilagus audubonii)* and black-tailed jackrabbit *(Lepus californicus)*. Mule deer *(Odocoileus hemionus)* move to lower elevations in the fall. Coyote *(Canis latrans)*, gray fox *(Urocyon cinereoargenteus)*, skunk *(Mephitis* spp.), and a number of small rodents can also be expected in the area.

Common reptile species in grassland and/or disturbed areas of Kirtland AFB include little striped whiptail *(Cnemidophorus inornatus)*, desert short-horned lizard *(Phrynosoma douglassi ornatissinum)*, leopard lizard *(Gambelia*

wislizenii), gopher snake *(Pituophis melanoleucus)*, and prairie rattlesnake *(Crotalus viridis viridis)*.

Kirtland AFB is within a migratory bird flyway, although most of the bird migration is over the Rio Grande Valley to the west of Kirtland AFB. Migratory birds sometimes migrate over Kirtland AFB due to weather conditions. Raptors (predatory birds), sandhill cranes *(Grus canadensis)*, and snow geese *(Chen caerulescens)* are among the birds that migrate through the river valley. Raptor species expected in the area of the base include Swainson's hawk *(Buteo swainsoni)*, red-tailed hawk *(Buteo jamaicensis)*, golden eagle *(Aquila chrysaetos)*, burrowing owl *(Athene cunicularia)*, and turkey vulture *(Cathartes aura)*. Avian species common on the base include horned lark *(Eremophila alpestris)*, western meadowlark *(Sturnella neglecta)*, lark bunting *(Calamospiza melanocorys)*, starling *(Sturnus vulgaris)*, scaled quail *(Callipepla squamata)*, mourning dove *(Zenaida macroura)*, and rock dove *(Columba livia)*.

There are no fishing streams or lakes on Kirtland AFB, and hunting is not allowed on base. Grazing of any kind has not been allowed on the base. The base has implemented a wildlife management plan for protection and conservation of wildlife.

Threatened and Endangered Species. Table 3.2-2 lists the sensitive species that may occur in the vicinity of Kirtland AFB. Most of the species listed in Table 3.2-2 are either transient migrants or do not have habitat on the sites proposed for construction.

The grassland habitat of the Manzano Area has a small potential for attracting some of the species listed in Table 3.2-2. Baird's sparrow *(Ammodramus bairdii)* is an autumn and winter migrant of the plains and lowlands. McCown's longspur *(Calcarius mecownii)* is a winter migrant dependent on the presence of grass seeds from grasses not grazed or mowed.

Plant species of special concern are the grama grass cactus *(Toumeya papyrocanthus)*, a federal Category 2 species, and the state-endangered Wright's pincushion cactus *(Mammillaria wrightii)* and white viznagita *(Neolloydia intertexta)*. One grama grass cactus and one Wright's pincushion cactus were found 1 mile west of the Manzano Area during a 1990 survey (U.S. Air Force, 1991).

Sensitive Habitats. There are no wetlands or other sensitive habitats associated with the Proposed Action sites.

Table 3.2-2. Listed and Proposed Endangered, Threatened, and Candidate Species at Kirtland AFB

Common Name	Scientific Name	Federal Status	State Status
Plants			
Grama grass cactus	*Toumeya papyracanthus*	C2	
Wright's pincushion cactus	*Mammillaria wrightii*		E
White viznagita	*Neolloydia intertexta*		E
Sacramento groundsel	*Senecio sacramentanus*		S
Dagger-thorn cholla	*Opuntia clavata*		S
Cyanic milk-vetch	*Astragalus cyaneus*		S
Santa Fe milk-vetch	*Astragalus feensis*		S
Spiny-leafed milk-vetch	*Astragalus kentrophyta var. neomexicanus*		S
La Jolla prairie clover	*Dalea scariosa*		S
Grayish-white giant hyssop	*Agastache cana*		S
Wild hollyhock	*Iliamna grandiflora*		S
Sandia alumroot	*Heuchera pulchella*		S
Birds			
Whooping crane	*Grus americana*	E	E
Bald eagle	*Haliaeetus leucocephalus*	E	E
Peregrine falcon	*Falco peregrinus*		E
American peregrine falcon	*Falco peregrinus anatum*	E	
Arctic peregrine falcon	*Falco peregrinus tundrius*	T	
Common black hawk	*Buteogallus anthracinus*		E
Ferruginous hawk	*Buteo regalis*	C2	
Mississippi kite	*Ictinia mississippiensis*		E
Mexican spotted owl	*Strix occidentalis lucida*	T	
Bell's vireo	*Vireo bellii*		E
Southwestern willow flycatcher	*Empidonax traillii extimus*	PE	E
Baird's sparrow	*Ammodramus bairdii*	C2	E
McCown's longspur	*Calcarius mecownii*		E
Mammals			
Meadow jumping mouse	*Zapus hudsonius*		E
New Mexican jumping mouse	*Zapus hudsonius luteus*	C2	
Black-footed ferret	*Mustela nigripes*	E	E

E = Endangered.
T = Threatened.
PE = Proposed for listing as endangered.
C2 = (Category 2) Federal category for species for which existing information may warrant listing, but for which substantial biological information to support a proposed rule is lacking.
S = State sensitive.

Sources: New Mexico Department of Game and Fish, 1985, 1990; New Mexico Native Plant Advisory Committee, 1984; U.S. Air Force, 1993.

3.2.2.2 Camp Navajo

The ROI for biological resources at Camp Navajo is the immediate vicinity of the igloos in storage Areas C and H.

Vegetation. Camp Navajo is bordered by two national forests: the Kaibab on the west, and the Coconino on the east. These Colorado Plateau forests contain the world's largest contiguous stand of ponderosa pine (*Pinus ponderosa*). Other habitats in the area include pinon-juniper woodlands, mixed conifer woodlands, riparian habitat, and mountain meadows. Understory species in all associations include juniper (*Juniperus* spp.), spruce (*Picea* spp.), aspen (*Populus tremuloides*), willow (*Salix* spp.), scrub oak (*Quercus turbinella*), gambel oak (*Quercus gambeli*), and various fir, grasses, forbs, and herbs in open stands.

Grasslands are comprised of various fescue (*Festuca* spp.), mountain muhly (*Muhlenbergia montana*), pine dropseed (*Blepharoneuron tricholepis*), blue grama (*Bouteloua gracilis*), western wheatgrass (*Agropyron smithii*), and cheatgrass (*Bromus tectorum*) occurring with scattered rabbitbrush (*Chrysothamnus nauseosus*), legumes, forbs, and ruderal species. Earth-covered storage igloos are planted mostly with introduced grasses such as wheatgrass, perennial rye (*Secale cereale*), and orchard grass (*Dactylis glomerata*). Many native forbs and grasses from adjacent areas have invaded the igloo areas, and these earth-covered mounds are well vegetated with both introduced and native species.

Wildlife. Species that inhabit Camp Navajo include black bear (*Euarctos americanus*), mountain lion (*Felis concolor*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), grey fox (*Urocyon cinereoargentus*), raccoon (*Procyon lotor*), skunk (*Mephitis* sp.), porcupine (*Erithizon dorsatum*), badger (*Taxidea taxus*), Abert squirrel (*Sciurus aberti*), jackrabbit (*Lepus* sp.), cottontail (*Sylvilagus* sp.), ducks, doves, geese, turkey, and pigeons. Pronghorn antelope (*Antilocapra americana*) are found in both national forests, traveling freely between Camp Navajo and U.S. Forest Service land. In the fall, elk (*Cervus canadensis*) and Rocky Mountain mule deer (*Odocoileus hemionus*) forage on Camp Navajo.

Threatened and Endangered Species. Table 3.2-3 lists the sensitive species that may occur in the vicinity of Camp Navajo. Many bird and mammal species are known to travel through Camp Navajo because of its proximity to natural areas; however, most of the listed species do not have habitat on the sites proposed for construction.

The Mexican spotted owl (*Strix occidentalis lucida*), a federally listed threatened species, occurs in both national forests and may be present within Volunteer Canyon on Camp Navajo. Volunteer Canyon lies near two major populations of the owls and is considered to be a valuable corridor

Table 3.2-3. Listed and Proposed Endangered, Threatened, and Candidate Species at Camp Navajo

Common Name	Scientific Name	Federal Status	State Status
Plants			
Arizona bugbane	*Cimicifuega arizonica*	C1	
Tusayan rabbitbrush	*Chrysothamnus molestus*	C2	
Arizona leather flower	*Clematis hirsutissima arizonica*	C1	
Tusayan flame flower	*Tarinum validulum*	C2	
Birds			
Bald eagle	*Haliaeetus leucocephalus*	E	E
Osprey	*Pandion haliaetus*	T	T
Northern goshawk	*Accipiter gentilis apache*		C
Common black hawk	*Buteogallus anthracinus*		C
Peregrine falcon	*Falco peregrinus*		C
American peregrine falcon	*Falco peregrinus anatum*	E	
Arctic peregrine falcon	*Falco peregrinus tundrius*	T	
Mexican spotted owl	*Strix occidentalis lucida*	T	
Spotted owl	*Strix occidentalis*		T
Yellow-billed cuckoo	*Coccyzus americanus*		T
Mammals			
Red bat	*Lasiurus borealis*		C
Occult little brown bat	*Myotis lucifugus occultus*	C2	
Spotted bat	*Euderma maculatum*	C2	C
Navajo Mountain Mexican vole	*Microtus mexicanus navajo*	C2	T
Reptiles			
Mexican garter snake	*Thamnophis eques*		C

E = Endangered.
T = Threatened.
C1 = (Category 1) Federal category for species for which existing data warrants proposing as endangered or threatened.
C2 = (Category 2) Federal category for species for which existing information may warrant listing, but for which substantial biological information to support a proposed rule is lacking.
C = State candidate.
S = State sensitive.

Sources: Arizona Game and Fish Department, 1988; U.S. Air Force, 1992a.

between the two populations. The bald eagle *(Haliaeetus leucocephalus)*, a federally listed endangered species, is known to winter in both national forests. Eagles are known to forage along lakes in the Coconino National Forest southeast of Camp Navajo and have been seen near the reservoirs. Populations of peregrine falcons *(Falco peregrinus)*, inhabit the Coconino National Forest south of Camp Navajo. They are not expected at Camp Navajo because suitable habitat is not present. The northern goshawk *(Accipiter gentilis apache)*, found on Camp Navajo and in surrounding areas, is a state-candidate species that prefers old growth ponderosa pine forest and nests in stands with 70 percent ground cover.

The occult little brown bat (*Myotis lucifugus occultus*) and the spotted bat (*Euderma maculatum*) are both federal Category 2 species whose habitat range could extend to Camp Navajo. Another federal Category 2 species, which could be found in Camp Navajo is the Navajo Mountain Mexican vole (*Microtus mexicanus navajo*).

Arizona bugbane *(Cimicifuega arizonica)* is a federal Category 1 plant species currently found in the Kaibab National Forest west of Camp Navajo. It is not known if the plant is present on the installation. The Arizona leather flower *(Clematis hirsutissima arizonica)* and the Tusayan rabbitbrush *(Chrysothamnus molestus)* are both candidate species found in the Coconino National Forest. The Tusayan flame flower (*Tarinum validulum*) is a Category 2 species whose habitat could include Camp Navajo.

Sensitive Habitats. Several small, spring-fed reservoirs are located in the ammunition storage area, but no sensitive habitats are located within the ROI for the Camp Navajo Alternative.

3.2.3 Cultural Resources

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, or any other tangible or intangible aspect of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources can be divided into three major categories: prehistoric resources, historic resources and structures, and traditional (e.g., Native American) resources.

Numerous laws and regulations require that possible effects to cultural resources be considered during the planning and execution of federal undertakings. These laws and regulations stipulate a process of compliance, define the responsibilities of the federal agency proposing the action, and prescribe the relationship among other involved agencies (e.g., the State Historic Preservation Officer [SHPO] and the Advisory Council on Historic Preservation). In addition to the NEPA, the primary laws that pertain to the treatment of cultural resources during environmental analysis are the National Historic Preservation Act (especially Sections 106 and 110), the

Archaeological Resources Protection Act, and the Native American Graves Protection and Repatriation Act.

Only those cultural resources determined to be potentially significant under the given legislation are subject to protection from adverse impacts resulting from a Proposed Action. To be considered significant, cultural resources must meet one or more of the criteria established by the National Park Service that would make that resource eligible for inclusion on the National Register of Historic Places (National Register). The term "eligible for inclusion in the National Register" includes both properties formally determined as such by the Secretary of the Interior and all other properties that meet the National Register listing criteria. Therefore, sites not yet evaluated are considered potentially eligible to the National Register and, as such, are afforded the same regulatory consideration as nominated properties. Whether prehistoric, historic, or traditional, significant cultural resources are referred to as "historic properties."

3.2.3.1 Kirtland AFB. The area of potential effect (synonymous with ROI) for cultural resources at Kirtland AFB has the potential to include all of the following areas within the Manzano Area.

- Plant 2 (Building 37100), constructed in 1950, is an underground facility cut into Manzano Mountain to be used for the storage of MMII Stage II rocket motors, and is composed of several storage rooms connected by a series of tunnels.

- Approximately 23 Type B, C, or D munitions igloos, constructed between 1949 and 1953, would be used for the storage of MMII Stage III rocket motors (for facility numbers, see Appendix B). Approximately seven of these Type C igloos would be used for the storage of A-3 Stage I motors. Use of the Type B or C aboveground igloos would require the installation of electric heaters; upgrade of electrical power service that may require ground disturbance; grounding of doors; replacement of some grounding rods; replacement of intrusion devices with an energy monitoring system; and repair of vents.

- Plant 4 (Building 37541), constructed in 1953, is a 13,520-square-foot building, which contains two drive-through maintenance bays, several offices, and several storage areas. Modifications to Plant 4 include the relocation of two fire hydrants and the shallow removal of 200 cubic yards of soil to accommodate movement of the stage transporter in and out of the facility.

- Buildings 37570, 37572, and 37573 (constructed in 1964, 1954, and 1954, respectively) are three supply-type warehouses adjacent to Plant 4 that may be used as supporting facilities for cradle storage or storage of inert missile system parts.

- Facility 30795, built in 1968, is a 30-ton gantry crane, located approximately 3.5 miles from the Manzano Mountain complex, which could be used for off-loading motors.

Prehistoric Resources. The area of the middle Rio Grande Valley and Kirtland AFB has a cultural resources chronology that extends approximately 11,000 years into the past. Prehistorically, the area has been divided into three periods: the Paleo-Indian period (9500 to 5500 B.C.); the Archaic period (5500 B.C. to A.D. 1); and the Puebloan, or Anasazi, period (A.D. 1 to A.D. 1540) (U.S. Air Force, 1990). A total of 173 prehistoric and historic archaeological sites have been recorded on the installation. Of the prehistoric sites, nearly all represent the Anasazi period.

There are no recorded prehistoric or historic archaeological sites located within the Manzano Area; however, a records search conducted in January 1993 at the Kirtland AFB Environmental Division, Office of Special Projects, indicates that no systematic prehistoric or historic archaeological or historic building surveys has been conducted within that area.

Historic Resources and Structures. The historic period in the area of Kirtland AFB began in the mid-1500s with Hispanic herding and farming. Spanish colonial settlements began in 1763 and mining flourished in the 1800s; Kirtland Air Field, now Kirtland AFB, was established in 1939.

Manzano Area History. The Manzano Area (originally named Site Able) was constructed as a separate, secure, hardened installation designed to house special resources and research facilities. Although construction began in 1946, the facility was not activated until 1950 and final construction on major facilities did not occur until 1961. Renamed Manzano Base in 1952, the installation was completely self reliant, with its own living quarters, Base Exchange, chapel, and mess hall. Control of Manzano Base transferred to Kirtland AFB in 1971 (U.S. Air Force, 1983; n.d.) with the continuing function of a weapons storage area.

Traditional (Native American) Resources. No traditional resources or Native American sacred or ceremonial sites are known to occur within the boundary of Kirtland AFB or in the Manzano Area. Native American groups that consider this area of New Mexico as part of their homeland (e.g., the Sandia Pueblo, the Isleta Pueblo, and the Jemez Pueblo) have been contacted in the past regarding the locations of sacred sites; however, the only response has been from the Jemez Pueblo indicating that they do not have any religious or cultural sites within the boundary of the installation.

3.2.3.2 Camp Navajo. The area of potential effect for cultural resources at Camp Navajo involves the following areas:

- Approximately seven earth-covered munitions igloos in Camp Navajo storage areas C or H, which were constructed in 1942, would be used for the storage of A-3 Stage I motors. Use of these igloos would require the installation of electric heaters and waterproofing insulation, which could require some earth removal; addition of electric power to support the heaters, which would require ground disturbance; modification of igloo doors (enlargement and grounding); new grounding rods for the igloos; installation of grounding bar cables inside the igloo, as well as lights and an energy monitoring system; addition or repair of a lightning arrestor system; repair of vents; and replacement or refinishing of igloo floors and the apron in front of the igloos.

Prehistoric Resources. Although the Paleo-Indian period (9500 to 5500 B.C.) is represented in the southwest, archaeological remains in the vicinity of Flagstaff are commonly identified as those of the Sinagua, which covered a period of time between approximately A.D. 500 and A.D. 1067 (Smithsonian Institute, 1979; Cordell, 1984). Thousands of prehistoric archaeological sites occur in the region, with small lithic scatters comprising the majority of sites in the area of Camp Navajo (U.S. Air Force, 1992d).

Previous and current record searches conducted at the Arizona State Museum, Northern Arizona University, the Museum of Northern Arizona, and the environmental office at Camp Navajo indicate that, prior to 1991, only one cultural resources survey (Dosh, 1986) was conducted at the installation. That survey covered 12 acres and no cultural materials were identified (U.S. Air Force, 1992d). A systematic archaeological survey performed in support of the storage of MMII rocket motors (U.S. Air Force, 1992a) was conducted in storage areas C and H in August of 1991 and identified six prehistoric sites associated with the late archaic or protohistoric periods. Igloos identified for the RSLP program would be located within the same area surveyed for the MMII program.

Historic Resources and Structures. The historic period at Camp Navajo begins with early American homesteading, lumbering, and sheepherding. The historic Overland Road, which was used between 1863 and 1892, passes through Munitions Area H. Camp Navajo was established in 1942 as the Navajo Ordnance Depot (see Section 3.1.2.2) and housed Austrian prisoners-of-war during World War II. Also during World War II a large Native American village was built to support construction crews and depot employees. Camp Navajo was transferred to the control of the Arizona National Guard in 1982. None of the historic areas of Camp Navajo are located within the area of potential effect for the Proposed Action; however, Camp Navajo World War II munitions igloos have been determined to be

eligible for inclusion to the National Register by the Arizona SHPO (U.S. Air Force, 1992a).

Native American (Traditional) Resources. Eight Native American groups have, at some time in the past, considered areas of Camp Navajo within their territory. The eight groups include the Hopi, Hualapai, Havasupai, Navajo, Yavapai Apache, White Mountain Apache, Tonto Apache, and Zuni (U.S. Air Force, 1992a). Consultation with these tribes in the summer of 1991 indicates that the Tonto Apache and Zuni do not consider Camp Navajo an area of concern. The Navajo do not consider Camp Navajo within their traditional homeland; however, because many Navajo lived at Camp Navajo during its construction and wartime operation, sensitive spiritual activity areas (e.g., former sweatlodge locations) that date to that time period remain and are of concern to the tribe. Hopi affiliation with Camp Navajo extends into aboriginal times, when their ancestors (the Anasazi) inhabited the area, and continues into more recent times (the 1950s) when clans from the Third Mesa may have exploited the area for native plants. The majority of traditional cultural concerns relating to activities at Camp Navajo are related to the Hualapai, who have used the area heavily for hunting and gathering. No traditional resources (e.g., burials or sensitive spiritual sites) are known to occur within the area of potential effect; however, to ensure that traditional cultural resources are appropriately considered and protected during this undertaking, consultation with appropriate Native American groups will continue according to established base policy.

3.2.4 Hazardous Materials/Waste Management

Hazardous materials and wastes are those substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S. Code [U.S.C.] Sections 9601-9675), and the Solid Waste Disposal Act as amended by RCRA (42 U.S.C. Sections 6901-6992). In addition, Title 18 of the Arizona Administrative Rules and Title 74 of the New Mexico Statutes also define hazardous wastes. In general, this includes substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to public health or welfare or to the environment when released into the environment. Executive Order 12088, under the authority of the U.S. EPA, ensures that necessary actions are taken for the prevention, management, and abatement of environmental pollution from hazardous materials or hazardous waste due to federal facility activities.

The U.S. Department of Transportation regulations for interstate shipments of hazardous substances are found in 49 CFR, Sections 100-199. The regulations restrict the type and quantity of hazardous substances that may be transported and require that each hazardous material container be properly packaged and labeled.

The relevant aspects of hazardous materials/waste management include the applicable regulations and procedures for hazardous materials usage and hazardous waste generation, and management programs for existing hazardous waste-contaminated sites. These are addressed so that potential impacts to installation management programs from the use and generation of project-related hazardous materials/waste, and from the possible disturbance of hazardous waste-contaminated sites, may be analyzed.

The ROI for hazardous materials and waste management is the proposed project area, immediate surrounding areas, and along the transportation routes. The installation management programs for hazardous materials and wastes and for hazardous waste-contaminated sites are discussed in the following sections.

3.2.4.1 Kirtland AFB. Aspects of hazardous materials/waste management that could be affected by the Proposed Action include hazardous materials, hazardous waste, and hazardous waste-contaminated sites. No asbestos-containing material (ACM) or polychlorinated biphenyls (PCBs) are located in any of the igloos that would be used. Plants 2 and 4 would not undergo any modifications with the potential to disturb ACM, PCBs, lead-based paint, or other hazardous substances that may be present; however, transformers that may need to be replaced as part of electrical system upgrades may contain PCBs. Therefore, ACM, lead-based paint, and other hazardous substances are not discussed further for Kirtland AFB.

Hazardous Materials Management. Air Force operations at Kirtland AFB use hazardous materials including paints, solvents, paint strippers, fuels, oils, herbicides and pesticides, a variety of chemicals and munitions, and radioactive materials. Hazardous materials usage on base is regulated by Air Force Occupational Safety and Health Standard 161-21, Hazard Communication; and the base has a Spill Prevention and Response Plan (Kirtland Operating Plan [OPLAN] 191-88). Activities involving fuels on base are managed by the fuels management branch. The base bioenvironmental engineering office maintains an inventory of hazardous materials brought on base by the Air Force.

On base, all Air Force and other non-DOE activities are covered under a RCRA Part B permit for Kirtland AFB. Hazardous materials brought on base by the DOE and contractors are not included in the inventory. The DOE has a RCRA Part A permit that covers hazardous material inventories, storage sites, permits, and management plans.

Hazardous Waste Management. The base has a Hazardous Waste Management Plan (OPLAN 195-921) to ensure compliance with the RCRA and New Mexico hazardous waste regulations, and a Waste Minimization Plan (Draft) to facilitate reducing the amount of hazardous waste generated on base. Hazardous waste is shipped off base by the Defense Reutilization

and Marketing Office (DRMO) and transported to a licensed out-of-state disposal facility by contracted transporters.

Kirtland AFB generated approximately 29,300 gallons and 1,200 pounds of hazardous wastes in 1990. These were primarily ignitables, corrosives, halogenated and nonhalogenated solvents, and toxics as defined by U.S. EPA hazardous waste designations.

All septic tanks inside the Manzano Area are registered under the base RCRA Part B permit as solid waste management units (Los Alamos Technical Associates, Inc., 1993).

Polychlorinated biphenyls. PCBs are industrial compounds used primarily in electrical equipment such as transformers. PCB equipment contains 500 parts per million (ppm) PCBs or more, whereas PCB-contaminated equipment contains between 50 ppm and 500 ppm PCBs. PCB items contain from 5 to 49 ppm PCBs. The U.S. EPA regulates the removal and disposal of all sources of PCBs containing 50 ppm or more under the Toxic Substances Control Act. Regulations are more stringent for PCB equipment than for PCB-contaminated equipment.

PCB-contaminated equipment (transformers and oil switches) is used in the Manzano Area. These devices will remain in use until a problem with their operation occurs, at which time they would be replaced and the PCB-contaminated equipment would be disposed of in accordance with the applicable regulations (Los Alamos Technical Associates, Inc., 1993).

Contaminated Site Management. A Phase I environmental baseline survey, conducted for the Manzano Area, has identified areas of potential hazardous waste contamination that could be affected by the Proposed Action. Evidence of water intrusion with a potential for contribution to possible site contamination was discovered in three of the igloos identified for possible RSLP use (Los Alamos Technical Associates, Inc., 1993). Areas of possible soil contamination were also identified at an underground storage tank at Plant 4 where diesel fuel may have been spilled, and an area to the southeast of Plant 4 where cleaning solvents may have been dumped (Los Alamos Technical Associates, Inc., 1993). A Phase II environmental baseline study is required to further evaluate these sites.

3.2.4.2 Camp Navajo. Aspects of hazardous materials/waste management that could be affected by the Camp Navajo Alternative would include hazardous materials, hazardous waste management, and hazardous waste-contaminated sites. No ACM or PCBs are located in any of the igloos. Because they would not be affected, existing conditions for ACM and PCBs, are not discussed further for Camp Navajo.

Hazardous Materials Management. Hazardous materials used at Camp Navajo include those associated with painting, vehicle maintenance, fueling activities, and munitions demilitarization. All handling of hazardous materials is conducted in accordance with requirements. The installation has a spill contingency plan as required by the National Oil and Hazardous Substances Contingency Plan (40 CFR 300) and AR 200-1, Environmental Protection and Enhancement.

Hazardous Waste Management. Hazardous wastes generated by Camp Navajo include obsolete conventional munitions, paint wastes, spent thinners, spent solvents, and sump sludge. Except for obsolete conventional munitions, all other wastes are treated and disposed of at an off-site treatment, storage, and disposal facility through the DRMO. Camp Navajo currently has two satellite waste accumulation points, two 90-day storage locations, and an open burning/detonation facility. Camp Navajo has submitted a RCRA Part B permit application for the open burning and open detonation of munitions, explosives, and propellants. Open burning is no longer conducted and all open detonation is expected to be completed by September 1994. The base plans to submit a formal closure plan in 1994. In the past hazardous substances were disposed of at Camp Navajo. Surveys of hazardous waste locations are expected to continue in the 1990s as a part of the Defense Environmental Restoration Program.

Camp Navajo has a Hazardous Waste Management Plan to ensure compliance with federal, state, and Army hazardous waste regulations. The plan includes a Hazardous Waste Contingency Plan (Spill Plan) as required by RCRA to address the potential for leaks and spills from hazardous waste storage sites, and a Hazardous Waste Minimization Plan.

Contaminated Site Management. Three Installation Restoration Program (IRP) sites are located in or near areas that could be affected by RSLP storage activities. Two igloos in Area H (one a former mercury storage site and the other a former pesticide storage site) are recommended for No Further Action pending regulatory approval. Neither igloo would be used for RSLP storage. The third IRP site is located in Area C where empty pesticide and paint containers were disposed of. This site has undergone a preliminary assessment and a removal action where the empty containers were removed. It is currently awaiting funding for further action. Although located in an igloo storage area, this site is not immediately adjacent to any igloos.

3.2.4.3 Transportation Routes. The ROI for hazardous materials/waste management along the transportation routes would be the existing vehicle service facilities (e.g., truck stops) where the tractor-trailers would be fueled and receive routine or emergency maintenance. A detailed description of hazardous materials/waste management at the specific locations would be impractical. However, in general, these locations would routinely handle

materials such as fuels, motor oils, and lubricants and would generate waste, such as used oils. These facilities would have applicable federal, state, and local operating and hazardous waste handling permits.

3.2.5 Utilities

The discussion of utilities focuses on capacities, availability, and the condition of systems for water, wastewater treatment, electricity, natural gas, and solid waste disposal.

3.2.5.1 Kirtland AFB. The ROI for utilities for the Proposed Action is the utility systems on Kirtland AFB that supply the facilities that would be used in support of the Proposed Action. Utilities at Kirtland AFB are generally considered adequate to meet existing and projected future demands.

Water. Water used on base in 1993 amounted to 5,400 acre-feet (1,700 million gallons). The base pumps groundwater from the Upper Rio Grande Basin and also purchases water from the city of Albuquerque. The base used approximately 70 percent of its annual allocation from this groundwater basin in 1993. Approximately 140,491 acre-feet (45.8 million gallons) of water were consumed in the city of Albuquerque in 1988.

The Manzano Area is supplied with water from a 6- and 8-inch pipeline that parallels Pennsylvania Avenue. Storage tanks in the Manzano Area have a combined capacity of 520,000 gallons. The water distribution network in the Manzano Area is limited to the northern and southern areas. This system is antiquated with problems with volume and reliability.

Wastewater. Kirtland AFB is connected to the city of Albuquerque's wastewater treatment plant, which currently operates at approximately 92 percent of capacity. A planned upgrade would increase the capacity of the system from 65 million gallons per day (MGD) to 76 MGD.

The southern portion of the Manzano Area uses septic systems for wastewater disposal. Current plans are to connect the Manzano Area to the base sanitary sewer system. There are no facilities for wastewater disposal in the eastern Manzano Area.

Electricity. Electricity is supplied to Kirtland AFB at 125 megawatts. Electricity in the Manzano Area is supplied from Substation 11, at the western edge of the southern area. This substation has a capacity of 5 megavolt-amperes. Current demand on it is approximately 770 kilowatts.

Natural Gas. There are no prescribed limits on natural gas supply at Kirtland AFB. There is no natural gas distribution to the Manzano Area.

Solid Waste. Landfill space in the solid waste disposal facility used by the city of Albuquerque is adequate to meet existing demand for approximately the next 10 years. The landfill at Kirtland AFB has an expected remaining life span of about 18 years, although this facility may be closed. The base would then use the Bernalillo County landfill at Cerro Colorado.

3.2.5.2 Camp Navajo. The ROI for utilities for the Camp Navajo Alternative is the utility systems on Camp Navajo that supply igloo storage areas C and H. Utilities that could be affected by the Camp Navajo Alternative include water, sewage, electricity, natural gas, and solid waste.

Water. Camp Navajo obtains its water supply from the shallow perched water table flowing from four natural springs. The total maximum potable water production available is 246,000 gallons per day. Water from the springs is stored in reservoirs with a combined storage capacity of approximately 23 million gallons. Average monthly water usage is approximately 3 million gallons.

Sewage. The on-base primary sewage treatment plant has a capacity of 72,000 gallons per day, and is operating at 85 percent of capacity. The effluent is discharged into holding lagoons, which are operating at 50 percent of capacity. The installation sewage collection system is being upgraded.

Electricity. Arizona Public Service supplies electricity to Camp Navajo by a 69,000-volt line. The main substation on the installation steps down the energy supplied from 999 kilovolt-amperes (kVA) to 7.2, 4.16, and 2.4 kVA for distribution throughout the depot. A 500 kVA generator provides backup power.

Natural Gas. Natural gas is supplied by Southern Union Gas with no prescribed limits on the amount Camp Navajo can use.

Solid Waste. Camp Navajo does not have an active landfill. Solid wastes are picked up and disposed of by private contractors.

3.2.6 Water Resources

Water resources include those aspects of the natural environment related to the availability and characteristics of water. These features include surface water, groundwater, surface drainage, floodplains, and water quality.

The primary federal laws and regulations governing water resources include the Clean Water Act, which establishes protection requirements and procedures for water quality, U.S. EPA Drinking Water Standards, and Executive Order 11988 (Floodplain Management), which was established to minimize impacts of federal programs on floodplains.

The ROI for surface waters includes any surface waters in the immediate vicinity of the proposed project area, drainages in the immediate vicinity, and any surface waters used by the project. The ROI for groundwater includes the aquifer(s) below the project areas, and any other groundwater resources that would be used to support the project.

3.2.6.1 Kirtland AFB

The ROI for water resources at Kirtland AFB includes the vicinities of Plant 4 and the igloos proposed for RSLP storage in the Manzano Area.

Surface Water. There are no perennial streams or waterways on Kirtland AFB. Storm runoff enters intermittent streambeds, which eventually feed into the Rio Grande.

Sudden storms in the desert environment can cause flash floods with resultant surface water flows. Generally, these flows are short term and restricted to existing intermittent stream washes. Most washes at Kirtland AFB feed into Tijeras Arroyo (to the west and north of the Manzano Area) and Arroyo del Coyote (south of the Manzano Area). Surface ponding can occur in depressions on relatively flat areas, and sheet flows can occur on sloped, nonchannelized terrain. Surface ponding can be a common occurrence during rainy seasons; sheet flows are a comparatively rare event.

The U.S. Army Corps of Engineers performed a Flood Hazard Information Report for Kirtland AFB; this study focused on the Tijeras Arroyo and the Arroyo del Coyote. Based on these studies, the areas with the highest likelihood of experiencing 100-year floods (i.e., having a 1 percent probability of being equalled or exceeded in any year) are the arroyos and adjacent areas (U.S. Army Corps of Engineers, 1979). None of the Proposed Action sites are located within these 100-year floodplains.

Groundwater. The groundwater source for Albuquerque and Kirtland AFB is the Upper Rio Grande Basin, which is a declared groundwater basin administered by the state of New Mexico. The Upper Rio Grande Basin is fully appropriated.

Kirtland AFB is appropriated 6,398 acre-feet (2,085 million gallons) per year from the Upper Rio Grande Basin, and pumped approximately 70 percent of this allocation in 1993. The base also purchases water from the city of Albuquerque. Groundwater levels in the city of Albuquerque's wells have been declining at a rate of 4 to 5 feet per year.

The quality of water derived from base wells is generally good and complies with drinking water standards. However, increased testing in the Albuquerque/Bernalillo County area has identified groundwater

contamination from human sources in numerous locations (Groundwater Protection Policy Coordinating Committee, 1992).

Most of the known contamination is in the city of Albuquerque near the Rio Grande, and is caused primarily from septic tank effluent. Other contamination includes nitrate levels (from septic tanks, lagoons, sludge beds, etc.) and contamination from leaking underground storage tanks, migration of materials from landfills, and industrial releases.

The city of Albuquerque and Bernalillo County are currently in the process of implementing a groundwater protection plan (Groundwater Protection Policy Coordinating Committee, 1992).

3.2.6.2 Camp Navajo. The ROI for water resources at Camp Navajo includes storage areas C and H.

Surface Water. Surface water flows at Camp Navajo are ephemeral and intermittent due to semiarid conditions. Since there is little or no groundwater or bank storage to maintain stream flow, flow occurs only during rainstorms or in the spring from snowmelt. Faults and fractures in limestone and volcanic vents influence the drainage pattern.

Surface runoff is less than would normally be expected, considering the topography and the amount of precipitation in the area. Interruption or detention of runoff and absorption of water by the underlying porous soils are contributing factors. According to the Soil Conservation Service, clay soils on site absorb more water than would normally be expected. As a result of these factors, most water never leaves the installation as surface runoff.

Camp Navajo industrial and potable water needs have always been supplied by four springs located on the camp. They produce a relatively low, but steady, yield of water. A number of storage facilities have been built throughout the installation to provide localized supplies of water for specific uses such as fire fighting.

A number of springs flowing from basalt in the northern section of the depot provide water for stock for most of the year.

Storm drainage on the installation is accommodated by an extensive network of ditches, culverts, and bridges. Open ditches and culverts provide adequate drainage along roads throughout the igloo area. Vegetation has been established in these drainageways to inhibit erosion.

Groundwater. The Kaibab Limestone occurs throughout Camp Navajo, either exposed on the surface or underlying alluvium or volcanics. The Kaibab is a brittle formation and is strongly jointed and fractured. In some

places, the fractures have been widened by solution into sinkholes. These fractures and sinkholes facilitate rapid recharge to the underlying Coconino aquifer. In the Camp Navajo area, the water in the aquifer is under water-table (unconfined) conditions, and lies at a depth of about 1,273 feet below land surface as measured in 1950.

Water obtained from the springs and the deep well is of good quality. Drinking water distribution systems comply with the Federal Safe Drinking Water Act. Groundwater and surface water usage and quality in the state of Arizona is regulated by the Arizona Department of Water Resources and Arizona Department of Environmental Quality, respectively. Most potentially contaminating activities occur down-gradient from the springs. Migration of contaminants into groundwater is inhibited by low precipitation, high evaporation, and impermeable clay soils, which impede percolation.

The installation is not located in a 100-year floodplain. Flooding is uncommon because the highly porous soils allow infiltration of water before runoff occurs. However, minor flooding can occur in several intermittent streams on Camp Navajo and below the reservoirs during periods of unusually high spring discharge. None of the Camp Navajo Alternative sites are located in these areas.

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter presents the results from the analysis of potential environmental effects associated with the Proposed Action and the Camp Navajo and No-Action alternatives. Changes to the natural and human environments that may result from the Proposed Action and alternatives were evaluated relative to the existing environmental conditions described in Chapter 3. For each environmental component, anticipated direct and indirect effects were assessed, considering both short-term (construction related) and long-term (operations related) project effects. The potential for significant environmental consequences was evaluated using the context and intensity considerations as defined in CEQ regulations for implementing the procedural provisions of NEPA (40 CFR 1508.27). Potential environmental impacts to air quality, biological resources, cultural resources, hazardous materials and waste management, utilities, and water resources for the Proposed Action and alternatives, and cumulative impacts (see Section 4.7) are discussed in this chapter.

4.1 AIR QUALITY

4.1.1 Proposed Action

Potential impacts to air quality from the Proposed Action at Kirtland AFB are from heavy construction equipment exhaust and fugitive dust generated during construction activities, and motor transport vehicle (tractor-trailer and flatbed truck) exhaust. These all represent potential temporary impacts. The Proposed Action would also result in a long-term increase in vehicle exhaust associated with additional personnel; however, operational impacts to air quality would not be expected from the Proposed Action.

Soil-disturbing activities under the Proposed Action create the potential for particulate emissions in the form of windblown fugitive dust. Particulate emissions and wind erosion of soil would be reduced by the application of water to disturbed soils and/or other soil stabilization methods during and after earth-disturbing activities. If the total disturbed area would exceed 3/4 acre, a topsoil disturbance permit from the City of Albuquerque Environmental Health Department, Air Pollution Control Division would be required. This permit would require implementation of a dust control plan.

Exhaust emissions from heavy construction equipment and motor transport vehicles would constitute a minor, temporary increase in regional air emissions. Heavy construction equipment would be required primarily for earth movement. The minimal heavy construction equipment needs and the periodic motor transport vehicle trips would generate a very small increase in overall emissions and would not cause a significant air quality impact.

The additional 5 to 12 personnel required for the Proposed Action would result in an increase in on-base and regional motor vehicle use. However, this small increase would result in a very minor increase in regional air emissions. This small number of additional personnel would also not affect existing transportation (see Section 1.3.1.1) and would not promote or add to any existing traffic congestion which would result in increased air emissions from motor vehicles.

Section 176(c) of the Clean Air Act provides that a federal agency cannot support an activity in any way unless the federal agency determines that the activity will conform to the State Implementation Plan's purpose of attaining and maintaining the NAAQS. The rule implementing this provision (40 CFR 51) requires a conformity determination for each pollutant where the total of direct and indirect emissions in a non-attainment area caused by a federal action would equal or exceed specified rates, and exempts those actions where total emissions are below those rates.

Based on the types and quantities of emission sources of the Proposed Action, emissions would be well below the rate for carbon monoxide in a non-attainment area of 100 tons per year; therefore, it is not necessary for the Air Force to prepare a conformity determination for the Proposed Action.

4.1.2 Camp Navajo Alternative

Sources of potential impacts to air quality from the Camp Navajo Alternative would be the same as those for the Proposed Action, except that there would be no exhaust from motor vehicle use by additional personnel. Existing MMII personnel would be used for the Camp Navajo Alternative. Impacts to air quality from motor vehicle use by these personnel were assessed in the MMII Storage EA (U.S. Air Force, 1992a), which concluded with a finding of no significant impact to air quality.

The earth covering of approximately seven storage igloos would need to be removed and then replaced, under the Camp Navajo Alternative. In accordance with Arizona Regulation R18-2-606, Material Handling, which addresses activities which may result in particulate matter becoming airborne, emissions in the form of windblown fugitive dust and wind erosion of soil would be reduced by the application of water to disturbed soils and/or other soil stabilization methods during and after earth-disturbing activities as required.

Motor transport vehicle (tractor-trailer and depot transporter) and heavy construction equipment exhaust emissions would represent minor, temporary increases to regional emissions and would tend to be readily dispersed due to the favorable air circulation patterns of the area.

4.1.3 No-Action Alternative

Because there would be no exhaust emissions from rocket motor transporters and heavy construction equipment, and no fugitive dust emissions from ground-disturbing activities under the No-Action Alternative, no potential impacts to air quality would occur.

4.2 BIOLOGICAL RESOURCES

4.2.1 Proposed Action

Potential impacts to biological resources from the Proposed Action would be presented by ground-disturbing activities associated with building modifications and utility upgrades. Existing buildings and roads would be used and earth-disturbing activities would be limited to modifications of aboveground igloos and in the area of Plant 4, and for electrical distribution system upgrades. The areas that would be disturbed at the aboveground igloos and the area adjacent to Plant 4 have been disturbed and would not provide habitat for any sensitive species potentially occurring in the Manzano Area. Because construction would occur in areas previously disturbed by installation of the current electrical distribution system, electrical system upgrade activities would not be expected to affect any threatened or endangered species or sensitive habitats. In general, the limited area of earth disturbance would limit potential impacts to biological resources.

4.2.2 Camp Navajo Alternative

Potential impacts to biological resources for the Camp Navajo Alternative would be the same as those for the Proposed Action. Earth-disturbing activities would be limited to the earth covering the seven A-3 storage igloos, and possibly for electrical distribution system upgrades. The area of the storage igloos has been disturbed, and no threatened or endangered species or sensitive habitats are known to occur in the igloo storage areas. The aboveground electrical distribution system would use a raptor-safe pole design that would not present an electrocution hazard to large birds of prey. No significant impacts to biological resources would be expected from the Camp Navajo Alternative.

4.2.3 No-Action Alternative

The No-Action Alternative would not result in any ground-disturbing activities and would not affect any endangered, threatened, or sensitive species, or any sensitive habitats; therefore, there would be no significant impacts to biological resources.

4.3 CULTURAL RESOURCES

Potential adverse effects to historic properties were assessed by (1) determining the area of potential effect; (2) identifying the nature and potential significance of the resources within the area of potential effect; and (3) assessing the effects that the undertaking would have on any significant resources.

An undertaking is considered to have an effect on a historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the National Register. An effect is considered to be adverse when it diminishes the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic properties include, but are not limited to:

- Physical destruction, damage, or alteration of all or part of the property
- Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or that alter its setting
- Neglect of a property resulting in its deterioration or destruction
- Transfer, lease, or sale of the property (36 CFR 800.9[b]).

4.3.1 Proposed Action

Plant 2. No interior or exterior modifications to Plant 2 would be required by RSLP program activities; therefore, no impacts to historic properties would occur.

Approximately 23 Type B, C, or D Munitions Igloos. As described in Section 3.2.3.1, all of the B, C, or D munitions igloos proposed for modification under the RSLP program were constructed between 1949 and 1953 and have therefore not yet attained the age of 50 years. In addition, none of these facilities demonstrate exceptional importance under any historic context, including the Cold War, that would make them eligible to the National Register. The only modifications required for the igloos that would have the potential to affect their exterior defining qualities is the minor repair of some of the vents. As such, no significant impacts to historic properties would occur from proposed igloo modifications, and the New Mexico SHPO concurs. (The Air Force formally requested a determination of no effect

from the SHPO in July 1993. In accordance with 36 CFR 800.5, if the SHPO does not object within 15 days, concurrence is assumed; no response was received.)

Plant 4. No interior or exterior modifications to Facility 37541 (Plant 4) are expected; therefore, no impacts to historic properties would occur.

Surface inspection of the areas adjacent to Plant 4 by archaeologists in January 1993 indicates that the small areas associated with the relocation of two fire hydrants (and the associated shallow removal of 200 cubic yards of soil) have been heavily disturbed through previous construction and operational activities, and no surface artifacts were identified. As a result, the presence of subsurface archaeological remains is unlikely. Because no cultural materials were identified and because ground disturbance adjacent to Plant 4 would be limited to shallow removal, no significant impacts are expected to occur.

Buildings 37570, 37572, and 37573. Because no interior or exterior modifications to Buildings 37570, 37572, or 37573 are required, no impacts to historic properties would occur.

Facility 30795. No modifications (beyond general maintenance) to the 30-ton gantry crane are expected; therefore, no impacts to historic properties would occur.

Mitigation Measures. Although no cultural materials have been identified within the area of ground disturbance and the area has been heavily disturbed from previous construction and operational activities, no professional systematic archaeological surveys have been conducted within the Manzano Area. As a result, there is a slight possibility that during RSLP activities, unexpected cultural materials could be uncovered. If cultural materials are encountered during any RSLP activities, activities would cease in the immediate area and a qualified archaeologist would be notified through the Kirtland AFB Environmental Division, Office of Special Projects. Subsequent actions would comply with 36 CFR 800.11 and the Native American Graves Protection and Repatriation Act.

4.3.2 Camp Navajo Alternative

Seven munitions igloos in storage areas C or H would require modifications as described in Section 3.2.3.2; these igloos have been determined to be eligible for inclusion to the National Register by the Arizona SHPO. However, because numerous identical munitions igloos exist at Camp Navajo in other storage areas, the Arizona SHPO has determined that no adverse effect would occur from modifications "as long as groups of historic igloos at Navajo Depot Activity are kept intact and maintain their historic integrity (e.g., in Areas A and F)" (U.S. Air Force, 1992a) (see Appendix B).

RSLP activities at Camp Navajo would take place within an area previously evaluated under the Air Force program for the storage of MMII rocket motors (U.S. Air Force, 1992a). As such, these areas have been surveyed and evaluated for cultural resources in consultation with the SHPO; the results and mitigation measures are described within the referenced document.

As described in Section 3.2.3.2, ground-disturbing activities associated with modification of the seven igloos for RSLP include the installation of power poles and underground electrical lines for igloo heaters, the upgrade of concrete aprons leading to the doors of each igloo, and the application of waterproofing insulation to each igloo roof. Roof soils and apron areas are heavily disturbed from original construction and no impacts to cultural resources are expected due to RSLP activities. Installation of power poles and underground electrical cables, however, have the potential to affect undisturbed areas where previously identified or unexpected cultural materials may occur. As such, procedures for the protection of cultural resources outlined in the previous environmental assessment (U.S. Air Force, 1992a) and developed in consultation with the Arizona SHPO would be continued and no significant impacts would be expected to occur. These procedures include:

- The construction contractor shall confine activities to areas defined by the plans or specifications unless prior written approval is granted by the site engineer. The land and cultural resources outside this area are to be preserved in their present condition.
- Archaeological and Native American monitors shall observe all ground-disturbing activities and advise the site engineer of ways to minimize impacts to cultural resources.
- Known archaeological sites will be avoided, if possible.
- Sites for poles will be identified in the field in the presence of archaeological and Native American monitors to avoid sensitive locations.
- If the post-hole auger unearths cultural materials, archaeological and Native American monitors will consult with the site engineer and, if necessary, the Arizona SHPO to determine appropriate mitigation.
- On-site education of personnel will be continued to avoid indirect impacts from unauthorized surface collection.

4.3.3 No-Action Alternative

Under the No-Action Alternative, RSLP rocket motors would not be transported to, or stored at, Manzano Mountain; therefore, no impacts to cultural resources would occur. Under the No-Action Alternative, A-3 rocket motors would not be transported to, or stored at, Camp Navajo. MMII activities at Camp Navajo would continue as described under previous environmental documentation (U.S. Air Force, 1992a); however, additional activities or impacts associated with the RSLP would not occur.

4.4 HAZARDOUS MATERIALS/WASTE MANAGEMENT

4.4.1 Proposed Action

Potential impacts to hazardous material/waste management are presented by the use and maintenance of motor vehicles used for transportation of the rocket motors, use and maintenance of equipment associated with transfer of the rocket motors, disturbance of hazardous waste-contaminated areas, and storage of MMII Stage III rocket motors.

Transportation Routes. The transportation of the rocket motors would involve the use of materials such as diesel fuel, motor oil, and other products routinely required by the tractor-trailers. The materials required (e.g., fuel, oil) and wastes produced (e.g., used oil) would be handled by existing vehicle service facilities along the routes. Hazardous materials/ waste management requirements would be essentially the same as those for other commercial transport vehicles. The routine use of these materials for the small number of vehicles required for the Proposed Action would not represent a significant impact to hazardous materials/waste management at such facilities along the transportation routes.

Kirtland AFB. Transport of motors to their storage locations and use of heavy construction equipment would pose hazardous materials/waste management impacts similar to those discussed for the tractor-trailer under the heading Transportation Routes. These types of materials are routinely handled on Kirtland AFB, and the quantities required for the Proposed Action would not represent a significant impact to existing base hazardous materials/waste management.

Any hazardous materials/waste spills associated with vehicle operation or maintenance would be handled according to the base spill prevention and response plan (Kirtland OPLAN 191-88).

Plants 2 and 4 would not undergo any modifications for RSLP activities under the Proposed Action; therefore, there would be no potential for disturbance of ACM or other hazardous substances that may be present. Any ACM would be managed in place. The areas of possible soil

contamination at Plant 4 could be disturbed during earth-moving activities. These areas and several igloos identified in the Phase I environmental baseline study for the Manzano Area as having the potential for possible contamination require further evaluation. The Proposed Action would be coordinated with the base environmental baseline study so that earth-moving activities at Plant 4 would not interfere with evaluation and possible remediation of the potentially contaminated areas. All igloos would be evaluated prior to release for use by the RSLP; any igloos found to be environmentally unacceptable would not be released for use.

Electrical distribution system upgrades may require replacement of existing transformers that may be PCB-contaminated equipment (50 to 500 ppm PCBs). Any PCB-contaminated equipment would be handled and disposed of in accordance with the U.S. EPA requirements under the Toxic Substances Control Act.

During long-term storage, MMII Stage III motors may produce small quantities of exudate containing nitroglycerin. Not all motors produce the exudate, and it is not produced consistently by a motor. Quantities produced by a motor would generally not exceed several grams in a 6-month period. The exudate is a viscous material that is cleaned from the motors using rags and a solution of sodium sulfite, alcohol, acetone, and water which neutralizes the nitroglycerin. The used rags would be handled in accordance with the Kirtland AFB RCRA permit and the base hazardous waste management plan (OPLAN 195-421).

Storage of MMII Stage II and A-3 Stage I motors does not require any hazardous materials or generate any hazardous wastes.

4.4.2 Camp Navajo Alternative

Potential impacts to hazardous materials/waste management would be the same as those for the Proposed Action as discussed in Section 4.4.1, except there would be no hazardous waste produced by the MMII Stage III motors. Storage of MMII motors at Camp Navajo is not part of the Camp Navajo Alternative as defined in this EA but is addressed in the MMII Storage EA (U.S. Air Force, 1992a). That EA concluded that no significant impacts to hazardous materials/waste management would occur from the storage of MMII motors at Camp Navajo. The hazardous materials required and hazardous wastes generated by heavy construction equipment and motor transport vehicle use (e.g., fuels, motor oils, used oils) would not represent a significant impact to hazardous materials/waste management at Camp Navajo.

Modification and use of igloos for RSLP motor storage would not interfere with the Camp Navajo IRP. The two igloo IRP sites in Area H would not be used for RSLP motor storage. The drum disposal IRP site in Area C is

remote enough that it would not be affected by modification and use of igloos in Area C.

4.4.3 No-Action Alternative

The No-Action Alternative would not require use of hazardous materials or result in disturbance of hazardous waste-contaminated sites or generation of hazardous wastes; therefore, there would be no impacts to hazardous materials/waste management.

4.5 UTILITIES

4.5.1 Proposed Action

Potential impacts to utilities on Kirtland AFB are discussed in the following paragraphs. Because no significant increase in regional population would occur due to the Proposed Action, no off-base impacts to utilities would be expected from the Proposed Action.

The Proposed Action may require electrical distribution system upgrades in the Manzano Area for the new heating systems in the aboveground storage igloos. Electrical distribution system upgrades would consist of replacing existing underground electrical lines that connect the igloos to secondary power transformers by trenching along these existing lines and installing heavier electrical cables. Environmental effects that could occur from this activity are those related to ground disturbance and are discussed under other resource areas (i.e., air quality, biological resources, cultural resources, and water resources). Upgrades may also include replacing existing electrical transformers. These transformers may contain PCBs (see Section 4.4.1). Other existing utility systems would be adequate to handle the transfer and storage of MMII and A-3 motors without upgrades.

The additional personnel required for the Proposed Action would represent an approximate 0.05 percent increase in the base work force. This increase in personnel would not cause a significant increase to on-base demands for electricity and water, and would not result in a significant increase in wastewater and solid waste generation. Although water distribution systems in the Manzano area are considered antiquated, with volume and reliability problems, the small increase in personnel would not present a significant increase in demand on this system.

4.5.2 Camp Navajo Alternative

Potential impacts to utilities on Camp Navajo are discussed in the following paragraphs. Because no increase in regional population would occur due to the Camp Navajo Alternative, no off-base impacts to utilities would be expected.

The Camp Navajo Alternative may require electrical distribution system upgrades for the new heating systems in the A-3 storage igloos. Electrical distribution to the igloo areas would be via an aboveground distribution system. Utility poles would be located adjacent to the existing igloo road system and power would be supplied to the igloo by an underground electrical cable placed in a trench extending from a power pole to the igloo. No significant environmental effects would be expected from the limited ground disturbance associated with this activity; however, potential impacts from earth disturbance to air quality, biological resources, cultural resources, and water resources for the Camp Navajo Alternative are discussed under those resource areas. Other existing utility systems would be adequate to handle the transfer and storage of A-3 motors without upgrades.

The Camp Navajo Alternative would not require any additional personnel. Therefore, there would be no impact to on-base utilities due to an increased work force.

4.5.3 No-Action Alternative

The No-Action Alternative would not require electrical system upgrades, or any additional personnel, along with concurrent additional demands on existing utility systems; therefore, there would be no impacts to utilities at either of the installations or their regional areas.

4.6 WATER RESOURCES

4.6.1 Proposed Action

Potential impacts to water resources at Kirtland AFB would be primarily from water erosion of disturbed soils that could affect surface drainage, accidental hazardous material/waste spills that could contaminate groundwater, and increased demands for water that could affect overdraft of water supply sources. The Proposed Action would not result in any direct discharge of wastes into surface waters or groundwater. None of the Proposed Action sites are located within a 100-year floodplain.

No permanent surface water exists near the Proposed Action sites; however, water erosion of disturbed soils would present a potential impact to adjacent surface water drainage systems. Because of the limited amount of soil disturbance (less than 5 acres total), an NPDES permit for storm water runoff would not be required. Because of the small area of soil disturbance and use of standard erosion control techniques, no significant impacts to surface water drainage would be expected.

Hazardous materials needs and hazardous waste generation associated with the Proposed Action (see Section 4.4.1) are minimal; therefore, the potential for an accidental spill of a hazardous material or waste that could affect

surface water or groundwater is minimal. No permanent surface water exists near the Proposed Action sites. Any accidental spill would be handled according to the base spill prevention and response plan identified in Section 4.4.1. Because of the low probability that a hazardous material/waste spill associated with the Proposed Action could affect groundwater, no significant impacts to groundwater quality would be expected.

Construction activities may require application of water to disturbed soils to reduce fugitive dust emissions and wind erosion of soils. This water usage would represent a limited and temporary increase in demand for water.

On-base water demand would increase in proportion to the 0.05 percent increase in the base work force. This would have an insignificant impact on the current overdraft of the aquifer that is the source of the base water supply. The Proposed Action would not require any other increased use of water that would affect overdraft of the aquifer.

4.6.2 Camp Navajo Alternative

Potential impacts to water resources at Camp Navajo would be the same as those described under the Proposed Action. The Camp Navajo Alternative would not result in any direct discharge of wastes in surface waters or groundwater. None of the proposed activities would occur within a 100-year floodplain.

The area of soil disturbance for the Camp Navajo Alternative would be less than 5 acres; therefore, an NPDES permit for storm water runoff would not be required. Due to the relatively gentle terrain of the igloo storage areas and use of standard erosion control techniques, no significant impacts to surface water drainage and surface waters would be expected from water erosion of disturbed soils on Camp Navajo.

Potential impacts to groundwater from accidental hazardous materials/ waste spills would be similar to those discussed in Section 4.6.1.

Construction activities may require application of water to disturbed soils to reduce fugitive dust emissions and wind erosion of soils. This water usage would represent a limited and temporary increase in demand for water.

The Camp Navajo Alternative would not require any additional personnel; therefore, there would not be any additional demands on local water supplies from operations.

4.6.3 No-Action Alternative

The No-Action Alternative would not change existing baseline conditions; therefore, there would be no impacts to surface water or groundwater resources.

4.7 CUMULATIVE IMPACTS

Cumulative impacts result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

4.7.1 Proposed Action

No other programs are currently planned for the Manzano Area at Kirtland AFB that would present the potential for cumulative impacts. A master plan for the Mesa del Sol area near Kirtland AFB includes a transportation corridor connecting Interstates 25 and 40 that would be routed through the base. The proposed transportation corridor would have limited access and could pass either to the west or east of the Manzano Area; however, an exact route and time frame for construction are not currently defined. While RSLP activities at Kirtland AFB are not expected to contribute significantly to any cumulative effects from construction and operation of the transportation corridor, each resource is briefly discussed below.

Air Quality. When assessed against the activities of proposed programs, RSLP activities would have no significant impact on local or regional air quality. Temporary and localized effects from fugitive dust may occur as a result of earth-moving activities associated with igloo modifications and utility upgrades; however, the dust would be controlled through the application of water to exposed areas and no significant impacts would be expected to occur.

Biological Resources. RSLP activities that could effect biological resources would be restricted to the small area of ground disturbance adjacent to Plant 4, possible upgrade of an existing electrical line, and modifications to the earth covering over existing igloos. All of these areas have been heavily disturbed through previous construction and operational activities, and none are known to support sensitive species or habitats. Some loss of native and/or introduced grasses would occur as a result of earth-moving activities during igloo modification and utility upgrades; however, this loss would be temporary and not significant. Because of this, no cumulative impacts would be expected to occur.

Cultural Resources. RSLP activities that could affect cultural resources would be restricted to the small area of ground disturbance adjacent to Plant 4, upgrade of an existing electrical line, and modifications to existing igloos; modifications would be primarily interior with minor exterior vent repair and would not affect any significant historic properties. All of the ground-disturbing areas have been heavily disturbed through previous construction and operational activities. Although no recorded archaeological sites are known to occur in the Manzano Area, the presence of such sites in other areas of the installation indicates the potential for unexpected discoveries. Mitigation measures outlined in Section 4.3.1 address this potential to ensure that no significant impacts would occur.

Hazardous Materials/Waste Management. The quantity of hazardous materials and waste generated by RSLP activities is expected to be negligible. Any generated wastes would be removed from the site and disposed of at a permitted facility, in accordance with the Kirtland AFB Hazardous Waste Management Plan (OPLAN 195-921); therefore, no cumulative impacts would occur.

Utilities. With the exception of the electrical distribution system, which may require upgrade, all existing utility systems (including natural gas, sewer, solid waste, and water supply) are adequate to support any existing and projected demands; therefore, no cumulative impacts are expected to occur.

Water Resources. There are no permanent surface water bodies within the ROI. Erosion could precipitate minor impacts to adjacent surface water drainage systems during igloo modification; however, impacts would be temporary and would be minimized through use of soil stabilization and erosion control measures. The negligible amount of hazardous waste generated by RSLP activities minimizes the potential for any impacts from an accidental spill, and program activities would not produce any significant increase in water demand; therefore, no cumulative impacts are expected to occur.

4.7.2 Camp Navajo Alternative

Anticipated programs at Camp Navajo include the storage of additional crude rubber, rocket motors, air-launched and short-range attack missile motors, ignition separation assembly components, and conventional ammunition. Current operations include a variety of storage operations, including RSLP MMII motors, and the training of reserve soldiers for materials handling and ordnance, which will continue at the same level. Currently, there are no proposed construction programs except for those associated with RSLP MMII motor storage, such as igloo modifications, which are in progress (Arizona Army National Guard, 1993). While RSLP activities at Camp Navajo are not expected to contribute significantly to any cumulative effects, each resource is briefly discussed below.

Air Quality. When assessed against the above-described proposed and current operations, the additional RSLP activities would have no significant cumulative impact on local or regional air quality. Atmospheric conditions and favorable air circulation patterns quickly disperse air pollutants in the area, and the region is in attainment of the NAAQS. Temporary and localized effects from fugitive dust may occur as a result of earth-moving activities associated with igloo modifications and utility upgrades; however, the dust would be controlled as required through the application of water to exposed areas and no significant impacts are expected to occur.

Biological Resources. RSLP activities would take place in a previously disturbed area of the base where no sensitive species or habitats are known to occur. In addition, none of the above-described proposed programs are expected to take place within the same ROI. Some loss of native and/or introduced grasses would occur as a result of earth-moving activities during igloo modification and utility upgrades; however, this loss would be temporary and would not be significant.

Cultural Resources. The ROI for RSLP activities at Camp Navajo encompasses an area that is known to contain cultural resources that could be affected by igloo modification and utility upgrades. Procedures for the protection of cultural resources outlined in a previous environmental assessment (U.S. Air Force, 1992a) and developed in consultation with the Arizona SHPO are already in place and would be continued (see Section 4.3.2). In addition, because none of the above-described proposed programs are expected to take place within the same ROI, no cumulative impacts would occur.

Hazardous Materials/Waste Management. The quantity of hazardous materials and waste generated by RSLP activities is expected to be negligible. Any generated wastes would be removed from the site and disposed of at a permitted facility, in accordance with the 1992 Navajo Depot Activity Hazardous Waste Management Plan; therefore, no cumulative impacts would occur.

Utilities. With the exception of the electrical distribution system, which would require upgrade, all existing utility systems (including natural gas, sewer, solid waste, and water supply) are adequate to support RSLP and other current and proposed programs at Camp Navajo; therefore, no cumulative impacts are expected to occur.

Water Resources. There are no permanent surface water bodies within the ROI. Erosion could precipitate minor impacts to adjacent surface water drainage systems; however, those impacts would be temporary and would be reduced through the use of soil stabilization and erosion control measures. The negligible amount of hazardous waste generated by RSLP activities minimizes the potential for any impacts from an accidental spill,

and program activities would not produce any significant increase in water demand. In addition, none of the above-described proposed programs are expected to take place within the same ROI; therefore, no cumulative impacts are expected to occur.

4.7.3 No-Action Alternative

The No-Action Alternative would present no potential for significant cumulative impacts because there would be no change to existing conditions at Kirtland AFB or Camp Navajo.

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5.0 SAFETY CONSIDERATIONS

Relevant aspects of human health and safety for the Proposed Action and Camp Navajo Alternative are those related to the potential for accidental ignition or explosion of a solid propellant rocket motor during transportation, handling, and storage, and the consequences of an accidental ignition or explosion. DOD Directive 5154.4-S and Occupational Safety and Health Administrative Standard 1910-109 establish safety criteria for explosives. AFR 127-100 implements these directives and sets forth safety criteria for operations involving handling and storage of explosives on Air Force installations. AFR 127-100 establishes explosive safety-quantity distances. These are minimum separation distances between facilities for storage and handling of explosives and other nonrelated facilities and activities. Minimum separation distances are based on maximum quantities of explosives that may be stored at that location. These standards were established to prevent explosive propagation between one explosive storage/handling location and another, as well as to prevent or minimize injury or death to personnel.

At Camp Navajo, Army Regulation 385-64, Ammunition and Explosive Safety Standards, and the National Fire Protection Association code for the manufacture, storage, and use of explosive material are also used. At both Kirtland AFB and at Camp Navajo, the applicable explosive safety standards would be observed for all transport, transfer, and storage activities involving the RSLP rocket motors including the siting of transfer and storage facilities.

The transport, handling, and storage of RSLP rocket motors poses a low risk of accidents, and an even lower risk that such accidents could adversely affect human health or the environment. Nonetheless, emergency response procedures are in place for the RSLP. In the event of a mishap on an installation involving the motors, the installation commander would notify the RSLP program manager. During transport, the commercial carrier would be responsible for notifying the program manager of a mishap. Only activities necessary to secure the accident area and to rescue personnel would be authorized prior to notifying the RSLP program manager. If a motor catches fire during or following a mishap, no attempt would be made to extinguish it and a 4,000-foot clear zone would be established around the site. No other recovery procedures would be conducted without guidance from the RSLP program manager or the Ogden Air Logistics Command. If the installation commander were to determine that the situation is beyond the installation's capability to resolve, the RSLP program manager would contact the Ogden Air Logistics Command. This organization is responsible for all such recovery operations and would assemble and dispatch a recovery team to the mishap site at any time.

The analysis of potential accidents focuses on the three primary elements of such risks: the hazard/accident mechanism, the accident likelihood, and the severity of consequences to human health and the environment if such an accident were to occur.

This safety analysis parallels the Proposed Action and Camp Navajo Alternative as defined for this EA. Safety analyses for transport of MMII motors to Camp Navajo and Kirtland AFB, and for storage of MMII motors at Camp Navajo, have already been conducted as part of previous EAs (U.S. Air Force 1992a, 1992b); thus, this analysis includes consideration of only the following accident cases within the proposed RSLP storage effort:

1. Highway accidents involving transport of A-3 Stage I motors from SUBASE Bangor to Kirtland AFB and Camp Navajo

2. Accidents involving the transfer of MMII Stage II and III and A-3 Stage I motors at Kirtland AFB

3. Accidents involving storage of MMII Stage II and III and A-3 Stage I motors at Kirtland AFB

4. Accidents involving transfer of A-3 Stage I motors at Camp Navajo

5. Accidents involving storage of A-3 Stage I motors at Camp Navajo.

In this analysis the above cases were considered together with all applicable variable parameters (weather conditions, number and types of motors involved, etc.) in an effort to identify the "bounding-case" impact. The bounding-case impact is the greatest consequence produced as a result of a credible accident. This potential impact is used to determine the significance of the Proposed Action to human health and safety. Additional consideration is also given to potential effects on air quality, biological resources, cultural resources, physical resources, transportation, and water resources; however, it is health and safety considerations that drive the identification of the bounding case.

5.1 HAZARD/ACCIDENT MECHANISM

The A-3 Stage I and MMII Stage II motors contain a solid composite propellant that burns vigorously and is difficult to extinguish. However, the explosion potential of these motors is remote, and would likely be limited to pressure ruptures of the motor casing. Such a rupture would result in production of many fragments but only a localized region of significant blast overpressure.

In contrast, a MMII Stage III motor contains less propellant of a more explosive type. However, explosion of the Stage III motor would affect an area not much larger than the area affected by a casing rupture of the other motors (U.S. Air Force, 1992b). The propellant found in the MMII Stage III will not necessarily explode if involved in a fire, but can burn at a rapid rate (comparable to rubber tires).

Mechanisms that can produce an accidental ignition of a motor segment (but not necessarily an explosion) include: static discharge, lightning, or a nearby fire or explosion. Additionally, impact of a rocket motor casing against an object or penetration of casing may release enough internal or external frictional energy to cause ignition.

The credible mechanisms that may produce an accidental explosion of a motor (most especially the MMII Stage III motor) are more limited, i.e., only impact or nearby explosion. Both of these mechanisms require much greater force to produce an explosion than to ignite a motor; hence detonation is considered to be only a remote possibility. Therefore, even if the casing is hit and ruptured and the propellant ignited, the most credible event would be a brief but intense fire, rather than an explosion.

5.2 ACCIDENT LIKELIHOOD

There are three critical events during which accidental ignition of motors could occur:

1. Transportation of motors to Camp Navajo and Kirtland AFB (primarily due to impact and fire hazards)
2. Handling/transfer of motors between various facilities at either Camp Navajo or Kirtland AFB (primarily due to impact hazards)
3. Storage of multiple motors at either Camp Navajo or Kirtland AFB (due to any of the above mechanisms, including impact).

Each of these events must be considered in identifying bounding-case impacts.

Off-Base Transportation. For any shipment of rocket motors, DOD employs strict safety precautions to minimize the likelihood of an ignition accident. In addition, state-approved routes for transport of hazardous materials would be used to minimize the time spent traveling through population centers. All motor stages are shipped in special transport vehicles designed to provide a stable, shock-free environment for the motors. The rocket motors are placed on carriages in the tractor-trailer transport vehicle. These carriages are designed to provide a degree of restraint in case of inadvertent ignition.

DOD has had years of experience with road transport of motors. For example, operational transportation experience with Minuteman missiles consists of approximately 500,000 road miles, using transporter-erector vehicles to move complete missile systems between the deployment bases and launch facilities (often in adverse weather conditions, using secondary roads). In 30 years, only four rollover accidents have occurred, with none causing propellant ignition (U.S. Department of Defense, 1991). The Ogden Air Logistics Center, which is the weapons system manager for Minuteman, reported that during the system's life from inception to 1990 (the latest date for which data are available), over 11,000 Minuteman missile movements involving over 12,400 individual Minuteman solid stages have occurred by air, rail, or road without mishap (U.S. Air Force, 1992c). This accident experience compares well with the all-weather accident rate of 6.4 accidents for every 1 million miles traveled derived from existing data on interstate truck highway accidents, mainly primary highway route mileage (U.S. Nuclear Regulatory Commission, 1987).

Not every accident which might occur would result in ignition of a motor. Various estimates of the probability of ignition range from a high of approximately 1 ignition for every 10 accidents, to a low of 1 ignition in every 50 accidents. Thus, transportation of motors to Camp Navajo and Kirtland AFB presents only a remote potential for accidental ignition.

On-Base Handling/Transfer. All handling and transfer operations, involving only one motor at a time, will be conducted in accordance with procedures specified for each type of motor. These procedures are designed to minimize the hazard of a handling accident. Measures taken include the use of certified handling equipment, training for all personnel, and required use of motor grounding procedures. All steps must be performed in accordance with checklist specifications and technical order requirements.

Similar to transportation of motors, there is only a minimal potential for an accident to produce ignition. Data concerning the probability of such an ignition are not available. The probability should be much less than that for transportation since velocities and energies involved are considerably less.

Motor Storage. During static storage, a number of mechanisms could cause motor ignition, including impact, on-site fires or wildfires, and natural events (e.g., lightning strikes). Impact of a motor by on-site motorized equipment could occur. This is highly unlikely since vehicles would not normally operate around stored motors except during handling operations. Likewise, on-site fires are remote since there are no credible ignition sources inside storage igloos. In the event of a wildfire near the storage igloos there is a remote potential for motor ignition; however, the igloos are capable of effectively protecting stored rocket motors from such an event under normal conditions. The igloos would also provide effective protection against lightning strikes, reducing the potential of motor ignition. Other natural

events such as floods and earthquakes are considered to present even less of a threat.

The mechanisms above present a small but credible potential for a stored RSLP motor to ignite. In that event, fire would likely spread to all other motors in the storage igloo within a very short time due to the intense heat produced by even one burning motor. Thus any motor ignition accident involving stored motors would result in the ignition of all motors within a single igloo (siting and protection factors would prevent spread to other storage igloos).

5.3 POTENTIAL CONSEQUENCES OF ACCIDENTS

Of the accident cases discussed above, accidents at the storage location present the greatest release potential, while accidents during transportation can occur nearest to populated areas since they may occur anywhere along the transportation route; each of these represents a bounding case. In addition to human health and safety, accidents would have the potential to affect air quality, biological resources, cultural resources, physical resources, transportation, and water resources. No significant impacts would be expected to other resource areas. Potential impacts for all resources would be temporary. Potential consequences of transportation accidents on highways, and transfer and storage operation accidents at Kirtland AFB and Camp Navajo are discussed by resource area below.

Health Effects. Two effects need to be considered: effects due to case rupture, and effects due to exposure to combustion products formed during burning of the solid fuel.

Case Rupture. Case rupture presents a physical hazard in the immediate vicinity of the accident site. This is highly significant to transportation accidents where the exposed population may be in close proximity to the accident site. At storage locations, siting criteria and protection afforded by the igloos will considerably reduce the hazards. The severity of human health consequences due to case rupture depends on the proximity to and number of people exposed. For both the MMII and A-3 rocket motors, the force of the rupture explosion and the ejection of debris could be fatal to persons within 300 feet and could cause serious injuries and property damage within 700 feet of the mishap. Life-threatening radiated heat injury could occur to unprotected persons within 130 feet of the visible flame. Disabling injuries could result within 200 feet of the open flame.

Sound pressure waves emanating from an explosion would be of short duration, but may adversely affect individuals in the immediate vicinity of the accident.

Combustion Products. The combustion products produced during a fire present an inhalation hazard to persons downwind of the accident site. The combustion products will be carried to high altitude due to the buoyancy of the hot gasses from the fire, and will reach ground level at some distance downwind of the site (influenced by local weather conditions). Thus the greatest threat from combustion products occurs away from the immediate accident site, and can be equally significant in both transportation accidents and storage location accidents.

For both the MMII and A-3 solid propellant rocket motors, the combustion products produced by burning solid fuel include various organic species, oxides of nitrogen, carbon monoxide, carbon dioxide, and hydrogen chloride (HCl). The exact quantities of these products depends on the conditions of the combustion event (temperature, pressure, and reaction rate). Hazards due to individual components of the exhaust plume depend upon the possible adverse effects the chemical may produce, the quantities produced during combustion, and the ability of the chemical to travel downwind without being chemically altered to a nonreactive form. Of the combustion products identified, only HCl meets these criteria and poses a credible threat to human health.

HCl is classified as a primary irritant. When mixed with water (e.g., the moisture of our eyes, skin, or nose), HCl combines to form hydrochloric acid and therefore has the potential to be irritating to the eyes, nose, and throat. In extremely high concentrations (greater that 100 ppm), HCl can produce noticeable insult to the lungs and nasal passages, characterized by extreme discomfort and difficulty in breathing, and in extreme cases by pulmonary edema (Patty's Industrial Hygiene and Toxicology, 1981). The magnitude of the effects increases with greater concentrations and/or exposure durations.

Medical researchers have investigated the potential health effects of HCl at concentrations below those where severe tissue damage occurs (below several hundred ppm), using both animal and human subjects (Patty's Industrial Hygiene and Toxicology, 1981). These investigations have served to identify the HCl exposure levels where no noticeable tissue damage occurs, and where the primary observed effects are limited to irritation and watering of the eyes and nasal stinging. Examination of the available research data shows the following for one-time exposure periods of less than 1 hour in duration (American Industrial Hygiene Association, 1989, Patty's Industrial Hygiene and Toxicology, 1981):

- **Less than 10 ppm HCl.** Most individuals will experience little to no eye or nasal irritation effects.
- **Between 10 and 20 ppm HCl.** Eye and nasal irritation will become increasingly noticeable to most people, with a few

individuals experiencing considerable discomfort (watery eyes, nasal stinging, etc.).

- **Between 20 ppm and 100 ppm HCl.** No significant tissue damage will occur; however, irritation effects will be felt increasingly by all exposed persons. Irritation will become intolerable (extremely watery eyes, sharp stinging sensations when breathing) to an increasing percentage of individuals as concentrations approach 100 ppm.

- **Greater than 100 ppm HCl.** Irritation becomes intolerable to all individuals. Sensitive individuals may begin to experience actual tissue damage and possible health threats at concentrations slightly above 100 ppm.

There is no NAAQS or other applicable federal standard for exposure to HCl, although various exposure criteria have been developed. In the previous RSLP EAs, a 1-hour exposure of up to 0.5 ppm was used as the significance criteria. However, based on National Research Council and American Industrial Hygiene Association recommendations, concentrations as high as 20 ppm for a 1-hour accident-case exposure can be considered not significant.

Previous analyses conducted for transportation of MMII stages has concluded that although concentrations of HCl would reach a peak as far away as 6 miles from the accident site, no life threatening or long-term effects are anticipated since peak values would only exceed 0.5 ppm for very short durations (U.S. Air Force, 1992b). In the Minuteman analysis, consideration was given to the full range of credible meteorological conditions in order to assess the maximum potential impacts. A similar study conducted for the A-3 Stage I motor was performed using the full range of credible meteorological conditions. This study determined that the maximum ground-level concentration of HCl might occur as close as 2 miles and as far away as 9 miles from the accident site. Instantaneous peak concentrations could vary from 0.16 to 0.97 ppm with maximum 1-hour average concentrations of 0.02 to 0.16 ppm, none of which presents a significant exposure hazard (El Dorado Engineering Inc., 1993).

Previous analyses of accidents involving stored Minuteman stages at Camp Navajo concluded that maximum 1-hour concentrations would be below 0.5 ppm, and hence would not constitute a significant exposure (U.S. Air Force, 1992a). These analyses, like those for the transportation analyses, considered all credible meteorological conditions. Since there are no significant meteorological differences between Camp Navajo and Kirtland AFB, the results of the earlier study can be applied to storage of Minuteman motors at Kirtland to conclude that there would be no significant impacts there.

Analyses were performed for storage of A-3 Stage I motors, using the maximum possible number of nine motors in an igloo to determine the greatest possible impact. The analysis considered all credible weather conditions, and can be applied to both Camp Navajo and Kirtland AFB. These conditions included wind speed, atmospheric stability, and temperature variation with height. The effects of temperature inversions were excluded because it was concluded that credible temperature inversions at Kirtland AFB and Camp Navajo would not be capable of trapping the hot buoyant plume of combustion products and therefore would not affect its dispersion. The analysis demonstrated that the maximum concentration of HCl could occur between 6 and 17 miles downwind of the accident site at either location, with instantaneous peak concentrations of 0.27 to 1.4 ppm and maximum 1-hour average concentrations of 0.04 to 0.36 ppm. These concentrations do not present a significant exposure hazard at either proposed storage location (El Dorado Engineering, Inc., 1993).

Consequences associated with a transfer and handling accident at both Camp Navajo and Kirtland AFB are bounded by these storage accident analyses; therefore, no significant exposures will result from a transfer and handling accident at either installation.

Air Quality. Air emissions from an accident would be localized, one-time events of short duration (less than 1 hour). There would be no significant regional or long-term air quality impacts.

Biological Resources. Vegetation and wildlife could be adversely affected within 700 feet of the accident. Additionally, acid rain could cause spotting of vegetation downwind from the accident. Although there is the possibility that threatened and endangered species could be affected by an accident, the scarcity of these species locations, coupled with the low probability of an accident occurring, make this highly unlikely. In the event of an accident that affects sensitive species, the localized effect of the accident is not likely to jeopardize the continued existence of any species.

Cultural Resources. Any cultural or historical resources impacted by the accident could be damaged or destroyed by heat, fire, or the explosion. However, this possibility is considered remote. Post-accident surveys are typically performed to assess any impacts and would be coordinated through the installation environmental offices.

Physical Resources. Soil impacts at the site may be long term and may require cleanup actions to restore productivity. The small amounts of acid rain anticipated would likely be neutralized by generally alkaline soils found in most parts of the western United States.

Transportation. Potential impacts to infrastructure from accidents would be primarily limited to transportation effects. Transportation in the area may be

altered by physical destruction and/or blockage of routes following an accident. Emergency equipment may also block local transportation for a short period. Impacts would continue during rebuilding or repair of transportation routes.

Water Resources. HCl emissions could mix with water vapor in the air and be deposited in lakes and streams as acid rain. However, it is anticipated that the impacts due to acid rain would be insignificant because of the low concentrations of HCl and the one-time nature of the release. For the same reasons, other released combustion products would not be expected to affect water quality significantly.

5.4 CONCLUSIONS

Potential impacts to human health and the environment from an accidental rocket motor ignition are due to motor case rupture and exposure to the combustion products of the burning propellant. Concentrations of HCl produced during an accidental ignition would not present a significant exposure hazard to the public. Although debris and heat from a case rupture could cause death or serious injury and property damage adjacent to an accident site, the probability of an accident resulting in a case rupture is low. Therefore, the transportation of the A-3 stages and transfer and storage of MMII Stage II and III and A-3 Stage I would not be likely to have a significant impact on human health and safety or the environment.

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6.0 CONSULTATION AND COORDINATION

The following federal, state, and local agencies were contacted during the course of preparing this EA.

FEDERAL AGENCIES

Arizona Army National Guard, Camp Navajo, Arizona
U.S. Air Force, Kirtland AFB, New Mexico
U.S. Air Force, Norton AFB, California
U.S. Fish and Wildlife Service, Albuquerque, New Mexico

STATE AGENCIES

Arizona Department of Economic Security
Arizona Department of Environmental Quality, Air Quality Division
Arizona Department of Fish and Game
Arizona Department of Transportation
Idaho Department of Transportation
New Mexico Department of Game and Fish
New Mexico State Historic Preservation Officer
New Mexico Taxation and Revenue Department
Nevada Transportation Department
Oregon Public Utilities Commission
Utah Transportation Department
Washington State Patrol

LOCAL AGENCIES

City of Albuquerque Environmental Health Department
    Air Pollution Control Division
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APPENDIX A

FINDINGS OF NO SIGNIFICANT IMPACT FOR ENVIRONMENTAL ASSESSMENTS INCORPORATED BY REFERENCE

STORAGE OF ROCKET MOTORS AT NAVAJO DEPOT ACTIVITY BELLEMONT, ARIZONA

FINDING OF NO SIGNIFICANT IMPACT (FONSI)

Description of the Proposed Action and Alternatives

Proposed Action

The proposed action is to store 1,500 Minuteman II solid fuel rocket motors, staging ordnance, and inert hardware within 125 existing igloos and buildings located at Navajo Depot Activity (NADA), Bellemont, AZ. Approximately 123 igloos will be modified. The existing steel igloo doors will be replaced with larger steel doors; heaters and temperature and humidity monitoring devices will also be installed. Either a new facility will be constructed or an existing building will be modified to serve as a motor transfer facility. The main electric transformer substation will be modified and a new electric substation will be constructed on previously disturbed ground. A new overhead electric distribution system (pole line) will be constructed to supply power and fiber optic cable to the igloos.

Alternatives

Twenty potential alternative storage facilities were identified and evaluated. Eight of the 20 potential sites were eliminated from further consideration by several exclusionary criteria. Of the 12 existing storage facilities, only NADA remained after application of two additional critical screening criteria.

Impacts

Natural Environment

The Environmental Assessment concluded that no significant impacts, short or long term, would occur to the natural environment. Modification of existing facilities and construction of new facilities will take place within existing disturbed sites. Existing NADA roads will be utilized for construction and operation.

Minor fugitive dust may occur for short periods due to construction activities at existing disturbed sites. Although the accidental explosion and burning of a rocket motor is unlikely, short term effects to air quality could occur in the event of this type of accident. Pollutant levels outside the limits of NADA would be within acceptable health and safety standards. Additional automobile trips generated by up to 50 additional new employees and their

families will not significantly affect air resources around NADA or the region. Birds of prey, including the endangered bald eagle and peregrine falcon, will be protected against electrocution from the added power poles by implementing a power pole design adopted into standard construction practices that minimizes their death. Other impacts to listed species are not expected. No significant long term displacement or disruption of animal activities on or around NADA is expected.

Human Environment

The Environmental Assessment concluded that no significant impacts, short or long term, would occur to the human environment. Modification of the existing electrical substation and construction of a new electric substation will not make excessive demands on the power generating facilities in the region. The addition of up to 50 new employees and their families will not have a significant adverse impact on housing demand, public services, and infrastructure within Coconino County. Water supply, waste treatment facilities, and solid waste disposal pick up service at NADA are more than adequate to accommodate up to 50 new employees. Impacts to cultural resources will not be significant. Mitigations to the proposed action will include archaeological and Native American (Hualapai tribe) monitors during ground disturbance, a 100% survey of the electric distribution sites and site of the motor transfer facility modification, and mitigation of those sites encountered during construction in consultation with the State Historic Preservation Officer (SHPO).

The process of storing Minuteman II rocket motors at NADA will not significantly affect the natural or human environment.

Date 6 May 92

Jimmie J. Carpenter
Colonel, Arizona Army National Guard
United States Property and Fiscal
Officer for Arizona

James C. Sikra Date 5 Mar 92

James C. Sikra
Colonel, U.S. Air Force
Program Manager for Advanced Strategic
Missile Systems

FINDING OF NO SIGNIFICANT IMPACT

TRANSPORTATION OF MINUTEMAN II SOLID ROCKET MOTORS TO NAVAJO DEPOT ACTIVITY, ARIZONA AND KIRTLAND AFB, NEW MEXICO

Description of Proposed Action

The Proposed Action is to transport Minuteman (MM) II motors to the Navajo Depot Activity (NADA), Arizona and Kirtland Air Force Base (AFB), New Mexico, via the public highway system, from the following locations: Hill AFB, Utah; Utah Test and Training Range (UTTR); and Pueblo Depot Activity (PUDA), Colorado. The Proposed Action sets forth state-approved transportation routes to be used during MM II motor shipments. The purpose and need of the Proposed Action is to facilitate the deactivation of the MM II missile system by providing safe carriage of rocket motors to NADA and Kirtland AFB. There are no construction impacts associated with the Proposed Action.

Alternatives

a. Alternatives Eliminated: Both air and rail were eliminated as reasonable modes of transportation. The equipment needed to transport the motors by air or rail has not yet been designed.

b. No-Action Alternative: The No-Action Alternative was considered and is addressed in the attached environmental assessment (EA). Adoption of this alternative would mean that MM II motors temporarily stored at Hill AFB, UTTR, and PUDA would remain in place. Implementation of this alternative would eliminate all of the potential environmental impacts associated with transporting the MM II motors to Kirtland AFB and NADA. However, choosing this alternative would be inconsistent with the Air Force deactivation plan which has designated both NADA and Kirtland AFB as storage sites for decommissioned MM II missile motors. Further, PUDA is scheduled to be closed, and motor storage at Hill AFB and UTTR is occupying space needed for other planned missile maintenance activities. Therefore, the No-Action Alternative was rejected because it does not meet the Air Force mission requirement of providing long-term storage of MM II motors at approved storage facilities.

Environmental Consequences

The attached EA considered all environmental resources which could be potentially affected by the Proposed Action; consequently, the following resources were considered: air quality, water resources, soils, biological resources, noise, and safety considerations. The attached EA concluded that the Proposed Action would not produce any significant impacts on the above-mentioned resources. The only impact on air quality would be the negligible amount of carbon monoxide emitted from the transport vehicles, approximately 2 shipments per month. Other than occasional "road kills", biological resources would not be affected. Accident probabilities and consequences are discussed in the chapter entitled "Safety Considerations". The EA concludes that the probability of a propellant fire during transportation of motors is extremely low.

Evaluation

There will be no irreversible or irretrievable commitment of resources at Hill AFB, UTTR, PUDA, NADA, Kirtland AFB, or the transportation corridors as a result of implementing the Proposed Action. The Proposed Action would not eliminate any options for future use of the environment at or around the installations or along the transportation corridors. There are no known adverse environmental effects that cannot be avoided for the Proposed Action.

Conclusions

It has been determined, after consideration of all factors included in the EA and pertinent environmental legislation, that the action will not significantly affect the quality of the human environment, and there would be no significant environmental effects associated with this action. For the foregoing reasons, a Finding of No Significant Impact is appropriate, and an Environmental Impact Statement will not be prepared.

Approved: Lester L. Lyles
LESTER L. LYLES, Brig. Gen., USAF
Chairperson, Environmental Protection Committee
Hill Air Force Base, Utah

Date: 22 Dec. 1997

APPENDIX B

IGLOOS PROPOSED FOR MINUTEMAN II AND POLARIS MOTOR STORAGE, MANZANO AREA, KIRTLAND AIR FORCE BASE

Table B-1. Igloos Proposed for Minuteman II and Polaris Motor Storage, Manzano Area, Kirtland Air Force Base

Facility Number	Structure Type	Bunker Type	Net Explosive Weight Limitation (Class/Division 1.1) (pounds)	Current Status
37035	B	Aboveground	60,000	Occupied
36036	B	Aboveground	60,000	Occupied
37038	B	Aboveground	6,000	Occupied
37039	B	Aboveground	6,000	Occupied
37046	B	Deep	250,000	Occupied
37080	C	Aboveground	125,000	Occupied
37081	C	Aboveground	48,000	Occupied
37082	C	Aboveground	250,000	Occupied
37083	C	Aboveground	250,000	Vacant
37084	C	Aboveground	250,000	Vacant
37085	C	Aboveground	250,000	Vacant
37109	C	Aboveground	250,000	Occupied
37111	C	Aboveground	48,000	Occupied
37112	C	Aboveground	48,000	Occupied
37115	C	Aboveground	48,000	Occupied
37116	C	Aboveground	48,000	Occupied
37117	C	Aboveground	48,000	Occupied
37028	D	Deep	20,000	Vacant
37029	D	Deep	250,000	Occupied
37030	D	Deep	250,000	Vacant
37031	D	Deep	250,000	Vacant
37044	D	Deep	250,000	Occupied
37047	D	Deep	125,000	Occupied

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APPENDIX C

CORRESPONDENCE

ARIZONA STATE PARKS

800 W. WASHINGTON
SUITE 415
PHOENIX, ARIZONA 85007
TELEPHONE 602-542-4174

November 13, 1991

Ed Dumaine, P.E.
Chief of Siting and Environmental Division
Department of the Air Force
Ballistic Missile Organization (AFSC)
Norton Air Force Base, CA 92409-6468

RE: Navajo Army Depot Activity (NADA), Storage of Minuteman II Rocket Motors, DOD-Air Force

Dear Mr. Dumaine:

Thank you for your letter dated November 8, 1991 that responded to my letter dated October 24, 1991 to Colonel Triphahn at NADA regarding the above project. Since I wrote the letter to Col. Triphahn, Bob Munson in this office and I have discussed the project with Sergeant Don Hack at NADA and Harry Hensel at the Arizona Army National Guard (AANG) in a meeting at our office on November 7 and I discussed the project with Ted McKim in your office today. Following is a synopsis of the results of those discussions and our current understanding of the project; these comments are made pursuant to 36 CFR Part 800:

1. To be candid, receipt of the archaeological survey report directly from Tetra Tech raised more questions than answers as outlined in my letter of October 24. We are now aware that the Tetra Tech reconnaissance survey was done only for the purpose of preparing a draft Environmental Assessment (EA) for the proposed project and to obtain an idea of the kinds of cultural resources that might be within the project area. As such, we have no objections to the report.

2. We are also now aware that the Air Force will act as lead federal agency for the undertaking. Your letter of November 8 officially initiated Section 106 consultation.

3. I now understand that once specific project areas are identified, the Air Force will ensure that 100 percent of the proposed impact areas will be surveyed by a qualified archaeologist and that appropriate American Indian groups will be consulted about any concerns they might have. We are pleased that such will be the case.

4. It has been brought to our attention that the entrances to igloos in storage areas "C" and "H" and possibly in "B" and "E" will have to be enlarged to accompany the missile rocket motors. For your information, Mr. Munson in our office has determined that these World War II vintage structures (the igloos) may be eligible for inclusion in the National Register of Historic Places. However, we are also aware that igloos in storage areas "A" and "F" will not be affected by the proposed project. It is our opinion that as long as groups of historic igloos at NADA are kept intact and maintain their historic integrity (i.e. in areas "A" and "F"), the proposed Air Force project should result in a determination of no adverse effect.

5. Once the 100 percent archaeological inventory has been completed, our preference is to avoid all archaeological sites that are considered eligible for inclusion in the National Register. Your agency shares this opinion. I am familiar with the igloos storage areas at NADA and I believe that avoidance can be practiced in most cases.

6. In the event that avoidance of register eligible sites is not feasible, we both acknowledge that mitigation will be necessary and the agency will have to develop a data recovery plan that meets the requirements of 36 CFR 800.9(c)(1).

7. For your information, we are a little uncomfortable with your suggestion of plowing in lieu of trenching for cable installation. We acknowledge that plowing may result in less ground disturbance but our concern with plowing is that it prevents an archaeological monitor from seeing trench profiles and making meaningful assessments of the significance and functions of buried cultural remains.

In sum, your letter to us and the discussions with the appropriate DOD staff have alleviated many of the concerns raised about the initial submission from Tetra Tech. We now feel that this project can be handled in a rather straight-forward manner with minimal problems or delays. Thank you again for consulting with us; your approach to the project that includes active involvement with American Indians is commendable. We look forward to continuing our consultations and reviewing the draft EA and archaeological inventory report. If you have any questions, please do not hesitate to contact me.

Sincerely,

Robert E. Gasser
Compliance Coordinator

for Shereen Lerner, Ph.D.
State Historic Preservation Officer

cc: Lt. Col. Larry Triphahn, NADA
Harry Hensel, ARNG